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MAY, 1943

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Newsletter No. 5
MAY, 1943

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Reclaimed Rubber Production Increased - Quality Improved by Use of RPA No. 3

OUR scrap piles have become one of the most valuable sources of the nation's most important raw material, rubber. Consequently, the processing of scrap rubber into suitable rubber reclaim so that it can be re-used in our all-out war effort has become one of our most important national industries. RPA No. 3 is an active plasticizer or peptizer for vulcanized rubber. In the manufacture of reclaimed rubber it has three important and valuable functions:

(1) RPA No. 3 speeds up the devulcanization process thereby increasing plant capacity.

(2) RPA No. 3 softens the reclaim chemically thus reducing materially the amount of labor and power required.

(3) RPA No. 3-peptized reclaim is smoother, softer, and generally better processing than reclaim made from similar scrap rubber without RPA No. 3.

PAN RECLAIM PROCESS For scrap containing no cotton fabric a pan-reclaiming process using RPA No. 3 is very efficient. Ground inner tube scrap was mixed with various quantities of RPA No. 3 in an enamelled pan and heated in open steam at 80 lbs. per sq. in. pressure for 18 hours. The peptizing effect of the RPA is illustrated by the data in Table I.

TABLE 1

Peptizing Effect of RPA No. 3 on Inner Tube Scrap Reclaimed by the Pan Process

RPA No. 3 Per Cent on Scrap	Chloroform Extract—Per Cent	Increase in Devulcanization
Control 0.	12.	—
0.15	13.	8%
0.3	16.	33
0.7	18.	50
1.4	21.	75
2.8	24.	100

The use of RPA No. 3 greatly accelerates the devulcanization process, reducing the time required to produce a reclaim of given quality by as much as 50%.

ALKALI RECLAIM PROCESS In the presence of carbon black, alkali retards the peptizing action of RPA No. 3 and reduces its efficiency. For this reason it is impractical to add the RPA and alkali at the same stage of the process in reclaiming whole-tire scrap. Three practical methods of avoiding this difficulty are suggested:

(1) The peptizing agent may be added to the ground scrap and the mixture preheated in the autoclave before adding the alkali. The results of following this type of process are shown by the data in Table II comparing the increase in devulcanization (based on chloroform extract) when various amounts of RPA No. 3 are used. The mixtures containing 150 parts of ground scrap, 350 parts of water and the peptizer were preheated in an autoclave for 12 hours at 180°C. After cooling, sodium hydroxide was added to make a 5% solution and the mixture was given another 12 hours treatment at 180°C. The resulting material was washed free of caustic, dried and sheeted out as reclaimed rubber.

TABLE 2

Effect of RPA No. 3 on Devulcanization of Rubber Scrap in Alkali Process

RPA No. 3 Per Cent on Scrap	Chloroform Extract—Per Cent	Increase in Devulcanization
Control 0.	13.4	—
0.15	15.2	13%
0.3	17.8	33
0.7	21.75	62
1.4	20.05	50
2.8	19.1	42

(2) The peptizing agent may be added after the rubber scrap has been alkali-digested in the autoclave, washed and dried. The RPA No. 3 will exert its peptizing effect and materially soften and smooth out the reclaim due to heat built up during the refining, straining and sheeting operations. This process may be the most practicable since it involves no adjustment of the initial steps in the alkali process and merely necessitates the addition of RPA No. 3 at the drier exit. Its use at this stage will enable the manufacturer to obtain reclaim of the same quality with reduced power consumption and processing time, or a smoother, softer product with the usual time cycle.

(3) Where conditions warrant, it may be most practical to peel the tread from the carcass, reclaiming it by use of a modified pan or digester process in which about 0.25% RPA No. 3 is added to the tread scrap. The carcass, containing little black may be reclaimed by an alkali-RPA No. 3 process. The two reclaims may be blended prior to refining to produce whole-tire reclaim.

Through the mill

TIME will be saved if mail and samples intended for the staff of the Rubber Laboratory are addressed:

E. I. du Pont de Nemours & Co.
P. O. Box 525
Wilmington, Delaware

PRIORITIES — Preference rating certification or formal priority information must accompany all orders for the following chemicals:

Accelerator No. 8
Accelerator 833
Aerin
Aquarex MDL Paste
Heliozone
Retarder W

In order to avoid unnecessary delay in filling orders, please be sure all orders for these materials are accompanied by the necessary priority information presented in the form prescribed by the War Production Board for the particular rating under which you are operating.

HELIOZONE is a sun-checking resistor for rubber, reclaimed rubber, and Buna S compounds. Use it to obtain better surface finish and appearance as well as for sun-checking resistance.

GRANULAR 60% SODIUM ACETATE — Inquiries regarding, or orders for this material should be sent to:

E. I. du Pont de Nemours & Co.
Electrochemicals Department
Miscellaneous Sales Division
Empire State Building
New York, New York

or

E. I. du Pont de Nemours & Co.
Grasselli Chemicals Department
Wilmington, Delaware

DU PONT

RUBBER CHEMICALS DIVISION

BETTER THINGS FOR BETTER LIVING . . . Through Chemistry

India Rubber World, May, 1943, Vol. 108, No. 2. Published monthly by Bill Brothers Publishing Corp., Printing Office, Philadelphia, Pa. Editorial and advertising offices, 386 Fourth Avenue, New York, N. Y., U. S. A. Entered as second-class matter October 5, 1889, at the Post Office at Philadelphia, Pa., under the act of March 3, 1879. Subscription, United States and Mexico, $3.00 per year; all other countries, $4.00; single copies, 35 cents.

YOU'LL RE-ORDER WITCO CARBON BLACK NO. 12, TOO

Yes, WITCO CARBON BLACK NO. 12 has special advantages that are causing users to re-order it in increasingly larger quantities. It is an easy processing black that gives an excellent combination of low heat generating properties in the tire and high wear resistance in the tread when used in the production of heavy-duty tires made with either natural, synthetic or reclaim rubber. WITCO BLACK NO. 12 makes an excellent near substitute for furnace type black . . . and can be employed with highly satisfactory results in Buna S formulations. Samples will be sent on request.

WISHNICK-TUMPEER, INC.

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Foreign Office, London, England

WITCO

PRODUCTS FOR SHIPMENT ABROAD MUST POSSESS

Maximum Durability

IMPORTANT CONTROL TESTS are being made on materials produced for shipment abroad to insure maximum durability of product under extraordinary service conditions. This logical precaution prevents waste of raw materials and conserves valuable time and shipping facilities required for replacing products which might fail in actual service.

THE "NATIONAL" MODEL X-1-A UNIT is used for speedy and accurate determination of the resistance of products to weathering, which includes moisture, sunlight and thermal shock. In this task it is proving extremely successful as evidenced by the number of units now required by those agencies testing such materials.

Product specifications are being met with the X-1-A unit by manufacturers of plastics; rubber; rubber-like materials; fire, water and weather resistant fabrics for many purposes; protective and camouflage finishes and primers; and miscellaneous materials subject to change in sunlight and weather.

This apparatus is procurable on priority rating in accordance with regulations in effect at time order is placed. Write for descriptive catalog L-6400.

NATIONAL
TRADE-MARK
MODEL X-1-A *Accelerated* WEATHERING UNIT

NATIONAL CARBON COMPANY, INC.

Unit of Union Carbide and Carbon Corporation

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Carbon Sales Division, Cleveland, Ohio

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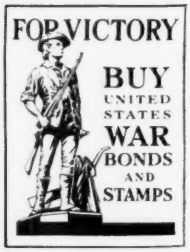

GUARANTEE YOUR RUBBER OR RECLAIM PRODUCTS

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- EASE OF DISPERSION AND PROCESSING
- RESISTANCE TO FLEX-CRACKING
- RESISTANCE TO COPPER CONTAMINATION

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BELT COVERS . . . FOOTWEAR . . . CLOTHING
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Naugatuck Chemical

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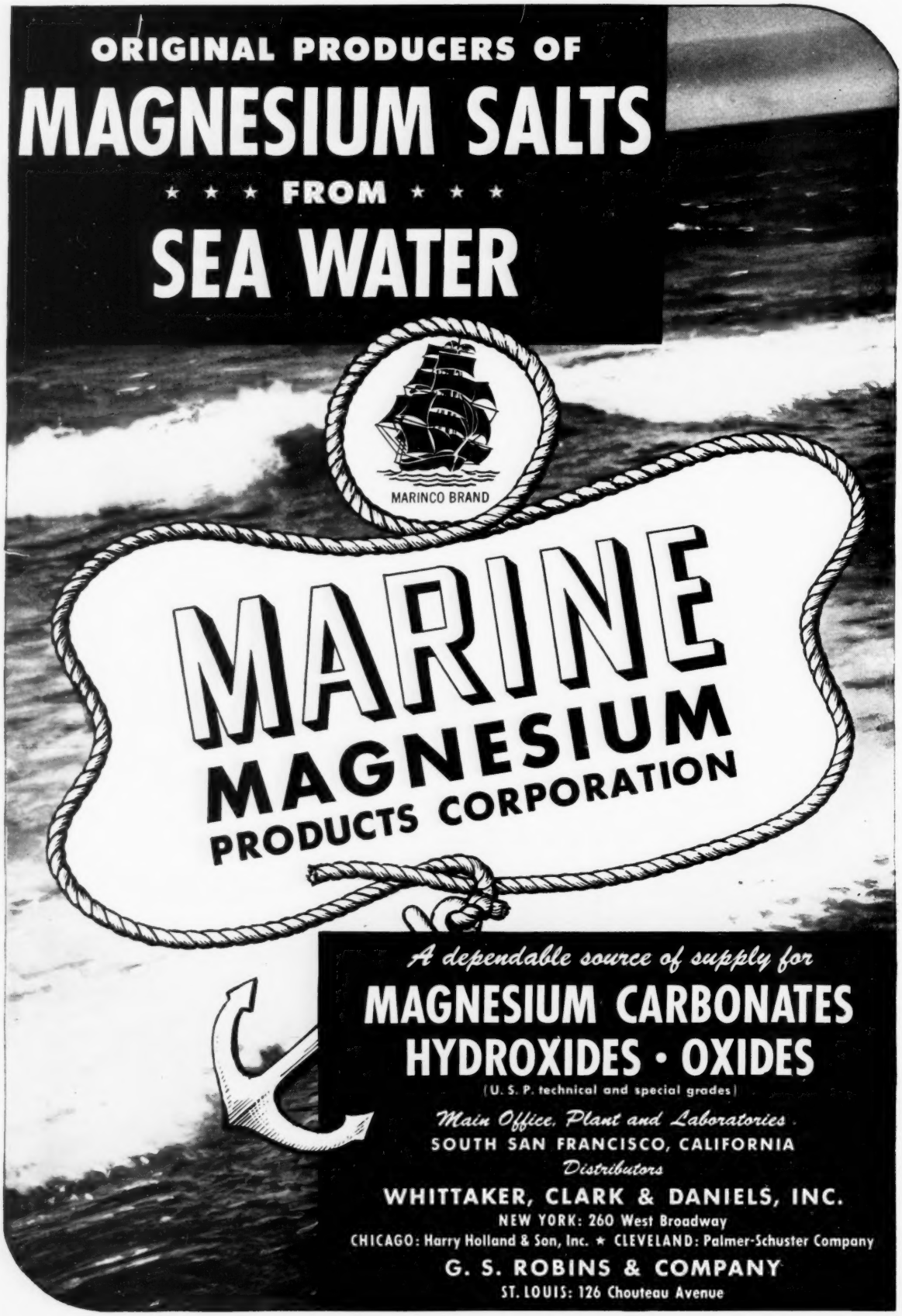
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FOR LOW TEMPERATURE FLEXIBILITY

Hycar OR-25

An important new type of Synthetic Rubber

Typical Compounds of Hycar OR-25 for Low-Temperature Service

	1601-HCR-8	1601-HCR-10	1601-HCR-12	1601-HCR-14	1601-HCR-16
Hycar OR-25	100	100	100	75	100
Hycar OS-10	.....	.....	.....	25	.....
Zinc oxide	5	5	5	5	5
Stearic acid	0.5	0.5	0.5	1	0.5
‡1107-HCR-8B	6	2	.....	2	2
Benzothiazyl disulfide	1.5	1.5	3	1.5	1.5
Tetrone A	.....	0.75	.....	0.75	0.75
Tetramethyl-thiuram disulfide	.....	.....	3	.....	.....
Plasticizer SC	15	15	15	15	15
Tributoxy ethyl phosphate	15	15	15	15	15
*Semi-reinforcing black	70	70	70	70	.....
Channel black	.....	.....	.....	.....	40
Fine ground whiting	.....	.....	.....	.....	40
	213	209.75	211.5	210.25	219.75

Physical Properties of the Vulcanizate

Original					
Min. Cure at 310°F.	30	30	30	30	30
Modulus at 300%	1500	1700	690	1400	600
Ultimate Tensile	2350	2310	1800	1850	1720
Ultimate Elongation	445	415	620	400	500
Tensile Sheet Hardness	52	54	49	54	54
Flexible to °F (loop Method)	−76	−68	−68	−68	−76
Brittle at °F (loop Method)	−104	−104	−94	−94	−94
SAE-ASTM parallel bend test					
5 hours at −40°F.	OK	OK	OK	OK	OK
5 hours at −65°F.	OK	OK	OK	OK	OK
Sp. Gr.	1.20	1.20	1.20	1.20	1.27
½ Inch Disc Cured at 310°F for 60 Minutes					
Shore Hardness	53	54	47	53	52
% Lupke Rebound	75	75	74	74	69
% Comp. Set ASTM Method B.	8	4	10**15†	7	13
% Comp. Set 70 hours at 212°F.	55	36	40**55†	32	45
Aged in Air Oven 70 hours at 212°F					
Ultimate Tensile	2650	2350	2250	2100	1780
Ultimate Elongation	275	285	355	285	345
Shore Hardness	61	63	61	64	63
180° Bend	OK	OK	OK	OK	OK
Immersed in ASTM-SAE Oil (Aniline point 159°F) 70 hours at 212°F					
Ultimate Tensile	2350	1880	1950	1400	1760
Ultimate Elongation	340	280	450	275	375
Shore Hardness	59	58	51	50	55
% Volume Change	−1	+0.8	+0.8	+20	+2
Immersed in AN-VV-O-366 Oil (Aniline point 189°F) 70 hours at 212°F					
Ultimate Tensile	2520	2200	2100	1590	1650
Ultimate Elongation	305	305	410	270	365
Shore Hardness	62	60	60	54	58
% Volume Change	−5	−3	−6	+12	−10
Immersed in Paraffin Lub Oil (Aniline point 230°F) 70 hours at 212°F					
Ultimate Tensile	2920	2900	2550	2125	1700
Ultimate Elongation	335	340	455	315	385
Shore Hardness	62	60	66	65	62
% Volume Change	−5	−3	−12	−7	−13
Immersed in 100 Octane Gasoline 70 hours at Room Temperature					
Ultimate Tensile	2120	1920	1700	1510	1590
Ultimate Elongation	385	360	600	310	455
Shore Hardness	53	54	47	51	51
% Volume Change	+1	+1	+1	+6	+0.7
Immersed in 100 Octane Gasoline with 40% Aromatics 70 hours at Room Temperature					
Ultimate Tensile	1250	950	950	600	450
Ultimate Elongation	285	215	400	170	265
Shore Hardness	44	50	35	45	44
% Volume Change	+21	+22	+24	+48	+19

* Gastex used in these recipes.
** Deflection 30%.
† Deflection 40%.

‡1107-HCR-8B Sulfur Masterbatch.

HYCAR OR-15	100
Channel black	50
Ground Sulfur	50
	200

RUBBER FABRICATORS who must meet aeronautical specifications requiring low-temperature flexibility now have available to them a new Hycar, especially designed for this exacting service.

Products manufactured from Hycar OR-25 not only possess excellent low-temperature flexibility, but also have other vitally important characteristics, as shown in the accompanying table.

For over 9 months prior to its release limited quantities were produced, enabling us to stabilize methods of manufacture and assure you of a uniform material. These limited quantities were used in a critical war application in which the product gave excellent performance.

With manufacturing technique established and field performance proven, we now make OR-25 generally available with full confidence in its superior characteristics and ease of compounding and processing.

EXPERIMENTAL QUANTITIES

The Office of Rubber Director has authorized us to set aside a limited quantity of this new product, which may be sold in amounts up to 25 pounds for experimental work, without allocation. We suggest that you place your orders at once.

HYCAR CHEMICAL COMPANY

AKRON, OHIO

Quick-return Tester now available in capacity up to 500 lbs.

* Scott Tester Model L-6 is our latest type of apparatus for testing dumbbell samples. It incorporates numerous advantages, prominent among them being the instant-return feature of the lower jaw. Now this model is available in capacity up to 500 lbs., retaining the quick-return advantage and the other features which make this tester Standard of the World for tensile and tear tests on rubber.

Request Bulletin L6

SCOTT TESTERS
*Registered Trademark

HENRY L. SCOTT CO.

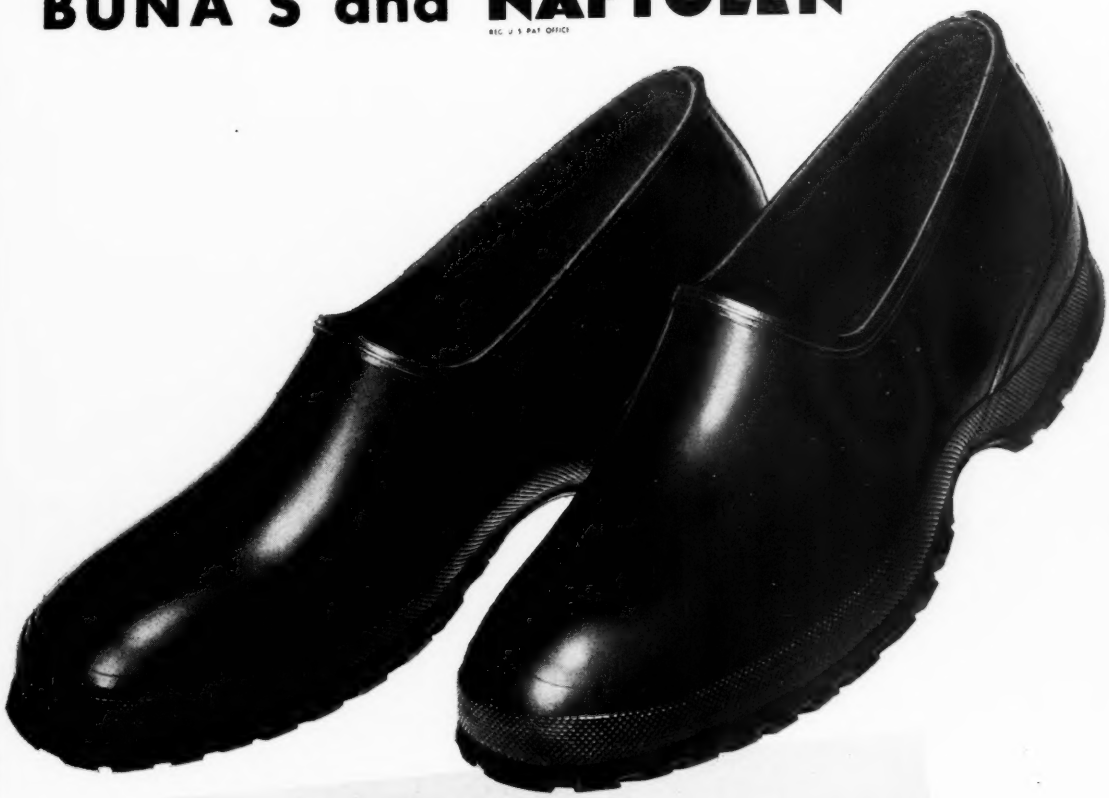
90 Blackstone St.
Providence, R. I.

Scott Testers — Standard of the World

A Good Pair . . .

BUNA S and NAFTOLEN

REG. U. S. PAT. OFFICE



Thousands of pairs of these GR-S work rubbers have come off the production line at the Goodyear Footwear Corporation's plant, Providence, Rhode Island. This firm, in making Buna S work successfully on a mass production basis, has utilized high proportions of Naftolen to advantage. The outsoles contain 100 parts of Naftolen for every 100 parts of GR-S, while the uppers use 60 parts of Naftolen for every 100 parts of synthetic rubber.

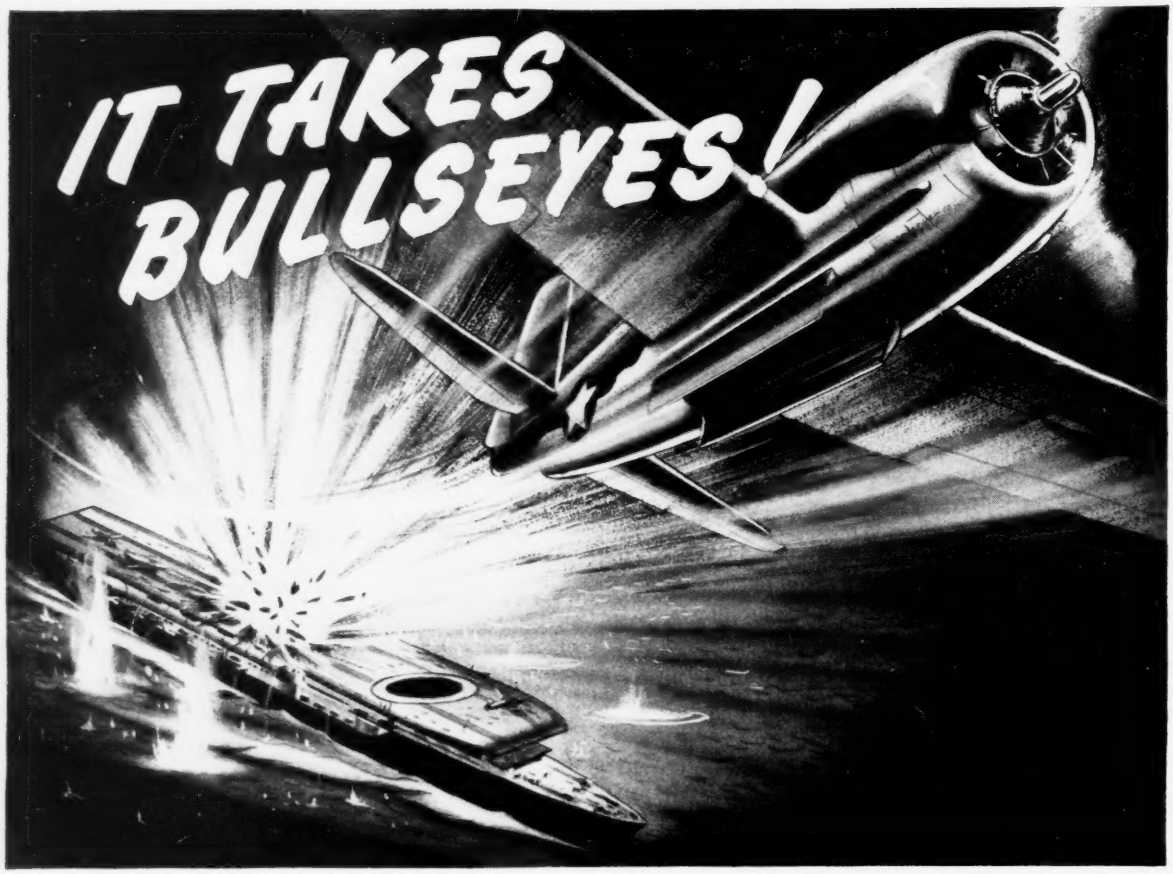
WILMINGTON CHEMICAL CORPORATION

10 East 40th St. New York, N. Y.

Plant and Laboratory: Wilmington, Delaware

W C C

REG. U. S. PAT. OFFICE



WHEN there's a fight going on, it takes good guns and *good gunners* to win. Near hits score no knockouts!

When you've *got to have* solvents—*almost* getting them to you when you want them adds up to no help.

That's why it will pay you to make firsthand acquaintance with SKELLYSOLVE and Solvents Division of Skelly Oil Company. We have the sources of supply . . . the refining facilities . . . the distribution organization. The Skellysolve reputation for delivering the goods has been built on performance in the pinches. Phone, write, or wire us and you'll *get* the solvents you need when you need them.

SKELLYSOLVE
in the
RUBBER INDUSTRY

There are six different types of Skellysolve which are especially adapted to various uses in the rubber industry, for making rubber cements, and for many different rubber fabricating operations. Skellysolve offers many advantages over benzol, rubber solvent gasoline, toluol, carbon tetrachloride, etc. It will pay you to investigate Skellysolve. Write today.

SKELLY

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SOLVENTS DIVISION, SKELLY OIL CO.
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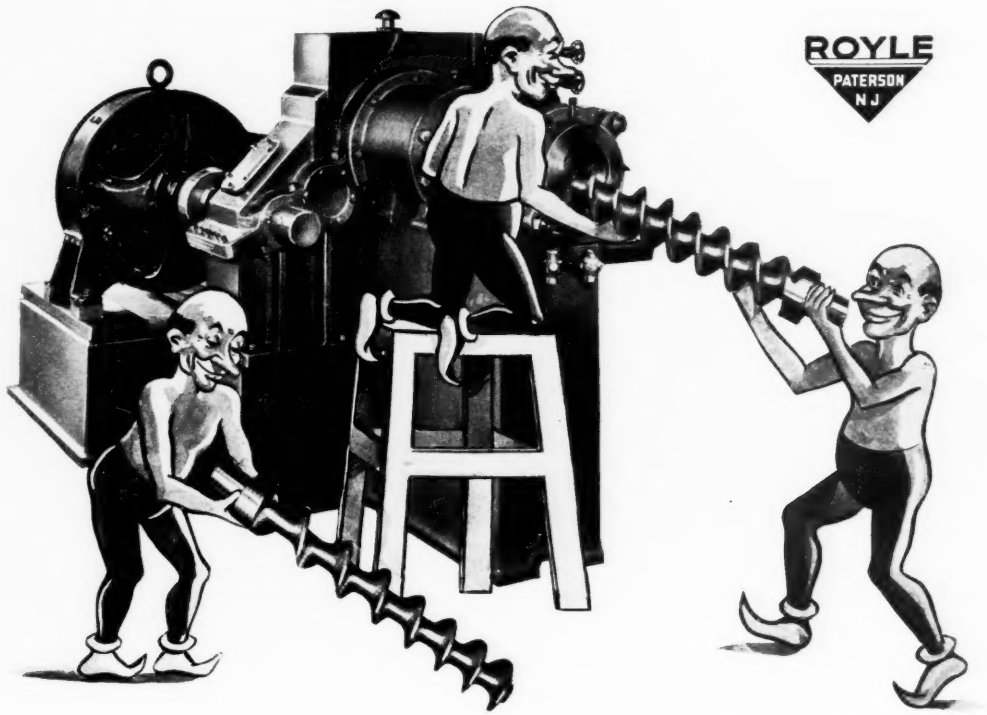
KEEP EXTRUDERS *in the FIGHT!*



Know Available Stock Screw Types!!

The extruding machine is daily being called upon to perform many new and varied tasks. Selection of the proper stock screw or feed worm is important. We manufacture screws of standard and special design for tubing, straining, covering . . . with rubber, synthetic rubber and plastic resins. For best results, use the correct screw. Let us assist.

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PATERSON, N. J.

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LONDON: JAMES DAY (MACHINERY) LTD.

Three FACTS TO REMEMBER

about TITANOX Pigments

1 Titanium dioxide, of which TITANOX pigments are the oldest representatives, is the most efficient whitening agent for natural, reclaimed and synthetic rubber.

2 Titanium dioxide, of which TITANOX pigments are the most widely used, is one of the best non-black rubber reinforcing pigments.

3 TITANOX pigments, now produced from American ore, are in unlimited supply for civilian use in addition to ample supplies for the armed forces.

We will gladly cooperate with technical men in the tire and rubber fields in matters involving the use of white pigments.

TITANIUM PIGMENT CORPORATION *Sole Sales Agent*
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TITANOX REG. U.S. PAT. OFF.

TITANOX TRADE MARK

An Important Decision on Synthetic Rubber for Tires

For more than a year this company's Buna rubber patents have been royalty-free to everybody for the duration of the war. On April 15, 1943 we offered, subject to the approval of our stockholders, to transfer permanently to the U. S. Government (through the Government's Rubber Reserve Company) patent rights on Buna-S . . . the tire rubber which forms the basis of the Government's synthetic rubber program. The Government's Rubber Director and Rubber Reserve Company have accepted this proposal. This is the first time, to our knowledge, that any company has offered to Government the right to license important patents—royalty-free—forever—to everyone—even to its competitors.

UNDER THE PROPOSAL:

1. The Government will have a free license for itself not only during the war, but for the entire life of the patents.
2. During the war the Government will have the right to issue royalty-free licenses for the entire life of the patents to everyone who cooperates with the Government in its war rubber program and reciprocates with similar licenses under its own patents.
3. There will be no payments to us or to others for the patent rights used.
4. The Government will increase its expenditures on synthetic rubber research to a total of not less than $5,000,000.

OUR PURPOSES:

1. To give every possible incentive to cooperation in the war rubber program.
2. To remove concern about the post-war patent situation from the minds of all those who have a contribution to make to this program.
3. To encourage American research and ingenuity—among independent workers, small companies and large—to build up a new and great American industry.
4. To continue to do everything we can to assure tires for America's cars—*always*.

FACTS ABOUT BUNA

In 1929 we bought from I. G. Farbenindustrie of Germany a minor interest in their Buna rubber processes for use outside of Germany.

•

During the 1930's these processes were further developed. The quality of Buna was improved, the range of its use widened.

•

In 1939—two years before Pearl Harbor—we bought out all German rights in the Buna processes for the U. S. A. Soon after, two large tire companies took out licenses. We also began building a Buna rubber plant of our own.

•

When war threatened the loss of our country's natural rubber supply, authorities agreed that Buna - S was America's best bet for tires. It became the basis of the Government's synthetic tire program.

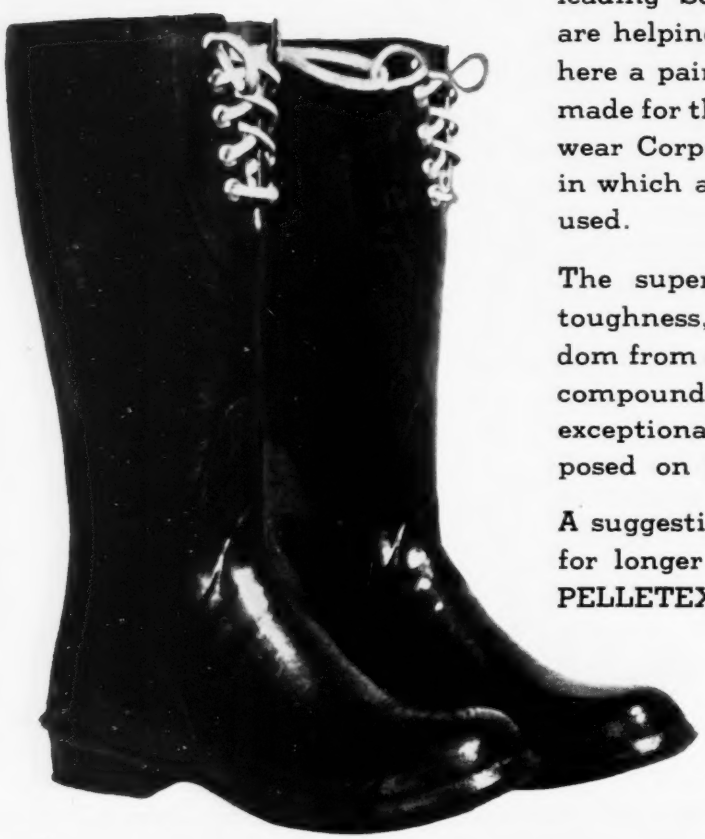
•

Today the Government is spending over six hundred million dollars on its Buna - S program. Six rubber plants are in operation. By the end of 1943 completed plants will have a capacity of 705,000 tons per year, or more than the entire normal peace-time rubber requirements of the United States.

STANDARD OIL COMPANY

(NEW JERSEY)

PELLETEX
for Army Overshoes



As an example of the many ways in which PELLETEX and GASTEX, the leading Semi-Re-enforcing Blacks, are helping to win this war we show here a pair of high rubber overshoes made for the Army by Goodyear Footwear Corporation, Providence, R. I., in which a PELLETEX compound is used.

The superior flexibility, resilience, toughness, aging properties and freedom from cracking make PELLETEX compounds admirably suited for the exceptionally harsh treatment imposed on military rubber footwear.

A suggestion for post-war planning: for longer wear — use GASTEX and PELLETEX.

HERRON BROS. & MEYER

OHIO BLDG., AKRON, OHIO.

GASTEX TRADE MARK

GENERAL SALES AGENTS FOR

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PELLETEX TRADE MARK

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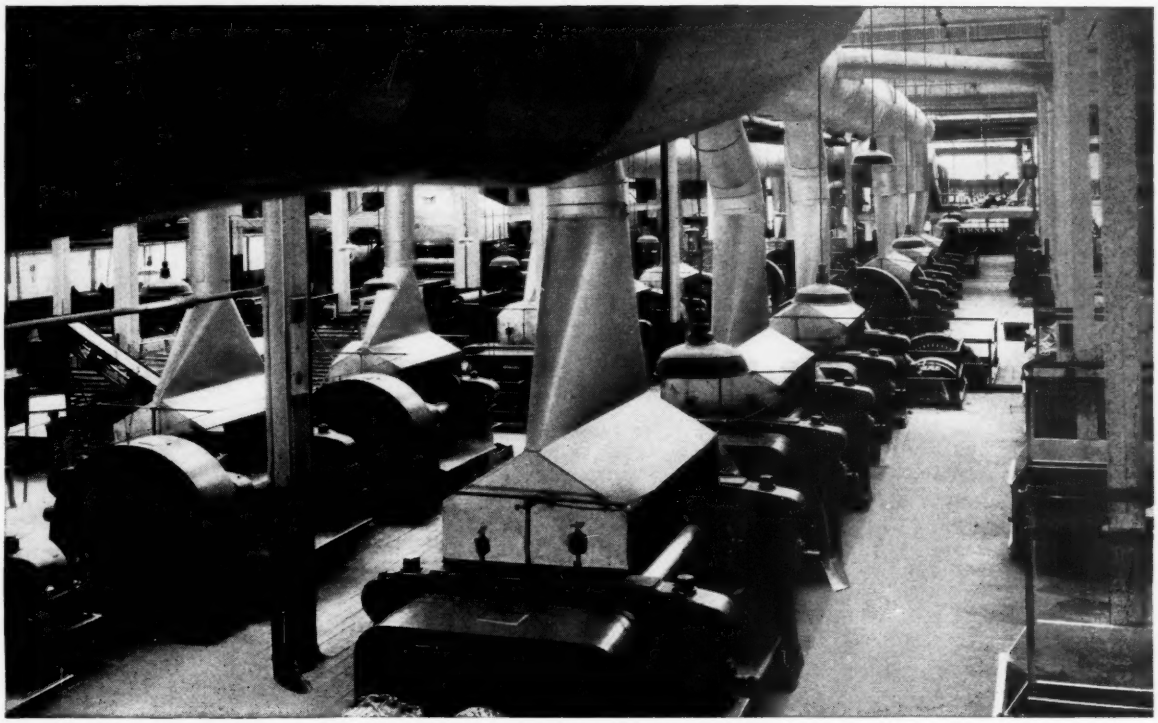
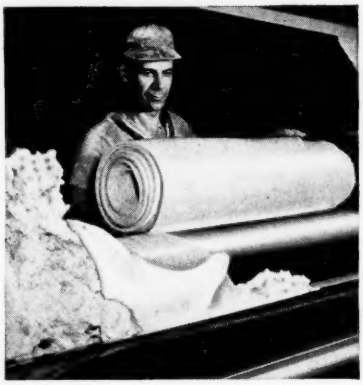




TERRIFIC FRICTION causes the rollers to become overheated, presenting a temperature control problem that Carrier Centrifugal Refrigeration is solving with gratifying results.

Centrifugal Refrigeration Speeds Production of

RUBBER for UNCLE SAM

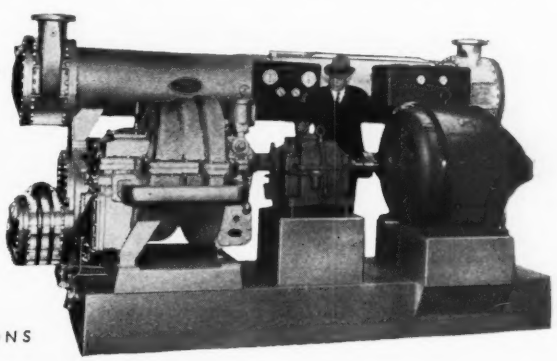
Carrier equipment is on 24-hour duty at a plant of General Tire and Rubber Company, helping to speed production of tire tread stock, cushion gum, gas-mask rubber, and rubber for barrage balloons, boats, life belts, and similar wartime products. Because the heat generated by working in the rolls cannot be carried away, the necessary prevention of overheating is the job of the Carrier Centrifugal Refrigeration Machine. Many advantages are offered by Carrier Centrifugal Refrigeration Machines. They are compact, space-saving units. Waste no essential materials in installation. Produce uniformly low temperatures at uniformly low costs. Carrier's experience in the rubber industry extends from 1915. Carrier engineers at your convenience will gladly discuss your problem to get greater production from your machines handling natural or synthetic rubber.

CARRIER CORPORATION, Syracuse, N. Y.

Carrier

ARMY E NAVY

AIR CONDITIONING • REFRIGERATION
INDUSTRIAL HEATING



41 YEARS EXPERIENCE IN INDUSTRIAL INSTALLATIONS

Control with Economy

For All-Purpose Synthetic Compounds

Plasticizing

For quick incorporation, low heat loss, low plasticizer extraction, low temperature flexibility, excellent tensile and smooth, easy-acting compounds—
PICCOCIZER "30"

Extending

For definite product improvement from economical compound extension; for better tack; higher resistance to flex-cracking and smoother extrusion —
EXTENDER 600

Reinforcing

For superior smoothness in reinforced compounds; for greater resistance to abrasion, tear and flex-cracking; for better quality in the finished product from an outstanding reinforcing pigment—
SILENE EF

Control of results in the finished Synthetic product starts with the *precision* uniformity of the materials selected to provide the desired properties . . . In Standard Chemical products *basic control* with *economy* is established first by multiple tests in the laboratory, and, second by the exacting procedures of chemical manufacture. Such uniformity is an assurance of an unvariable product quality that consistently measures up to your testing specifications . . . We will gladly send working samples and complete data on these outstanding products.

STANDARD
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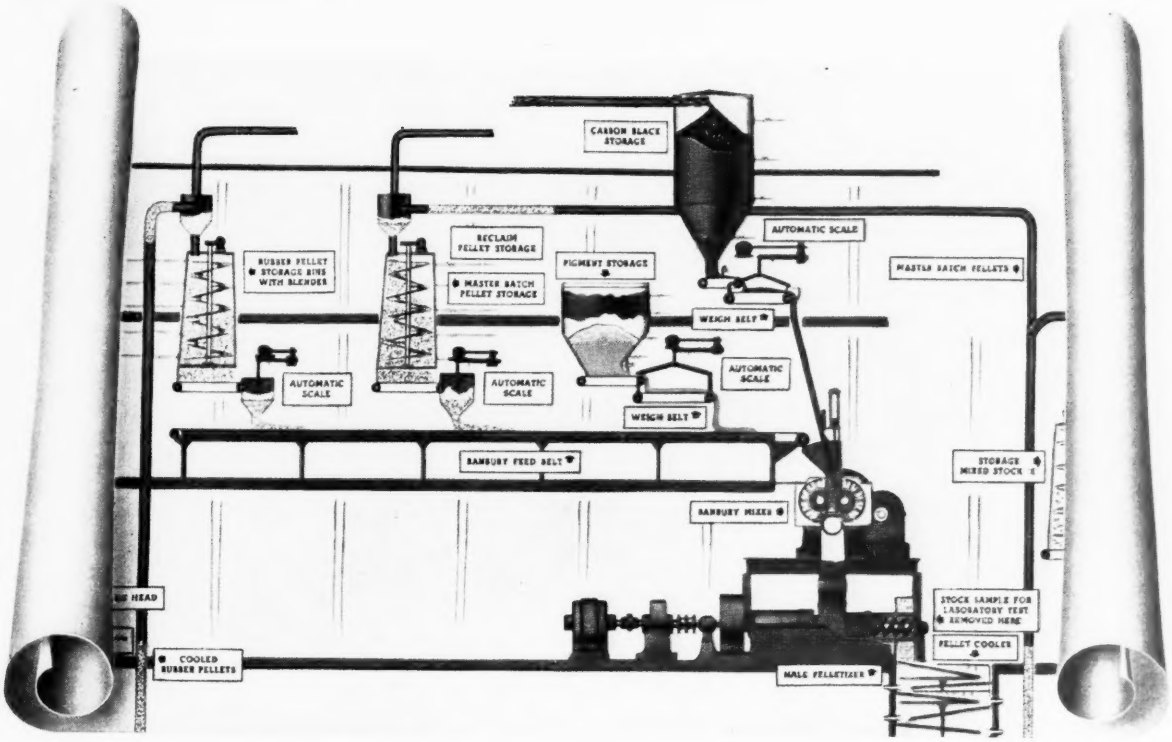

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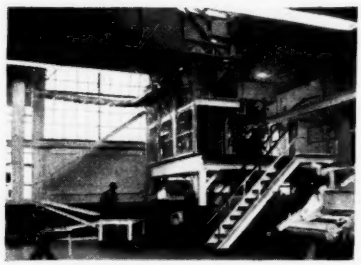

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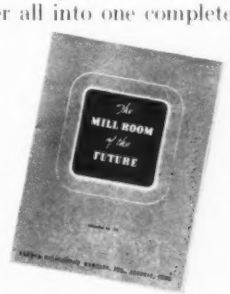

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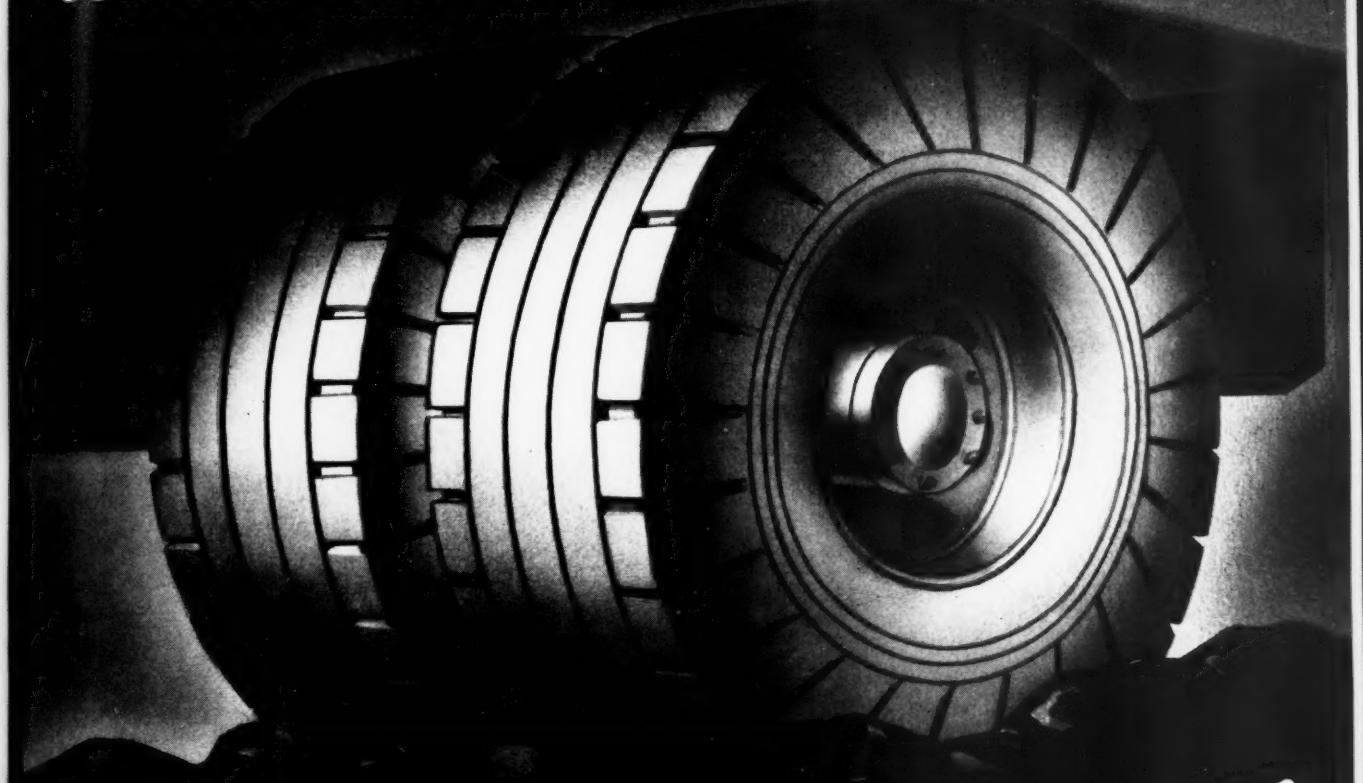

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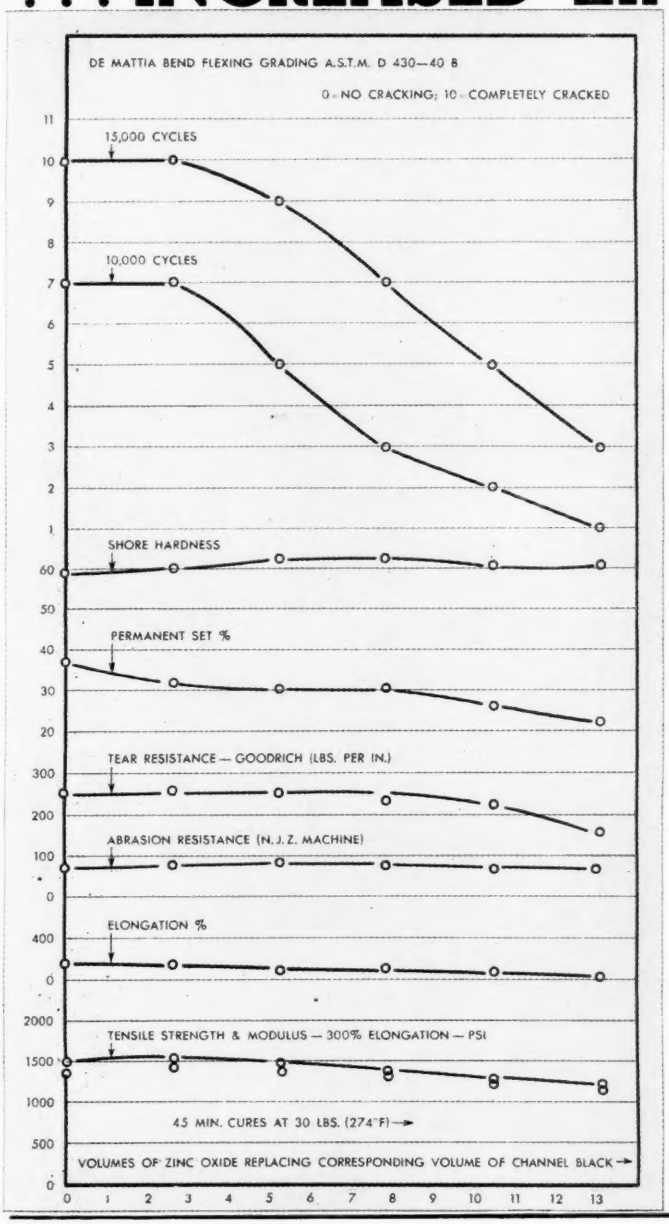
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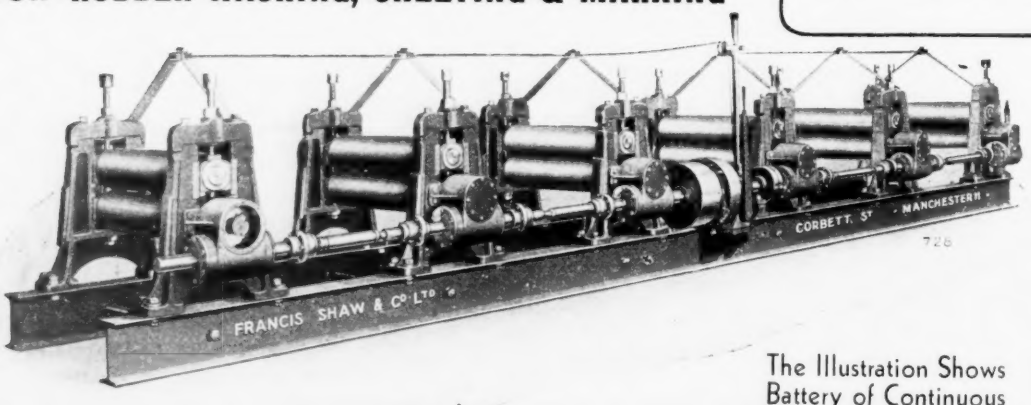

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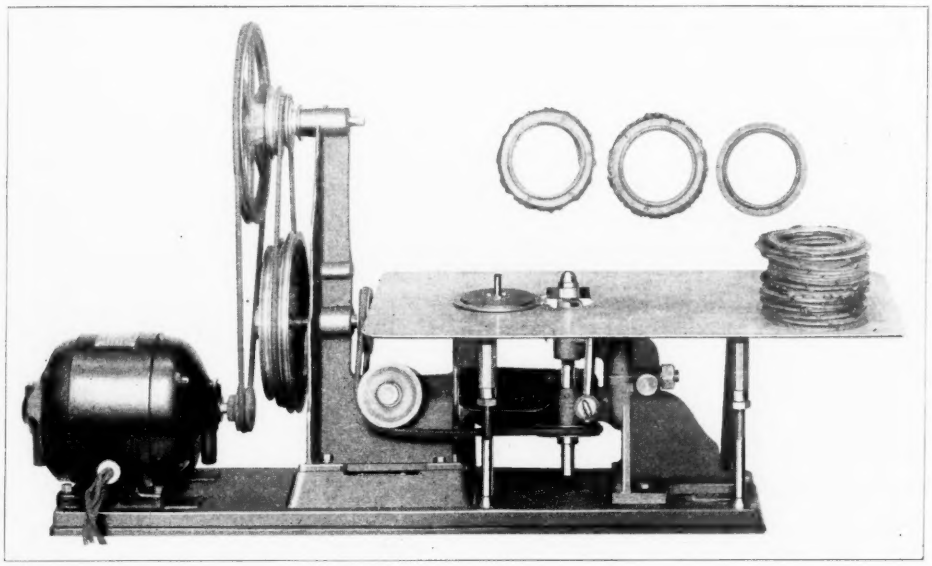

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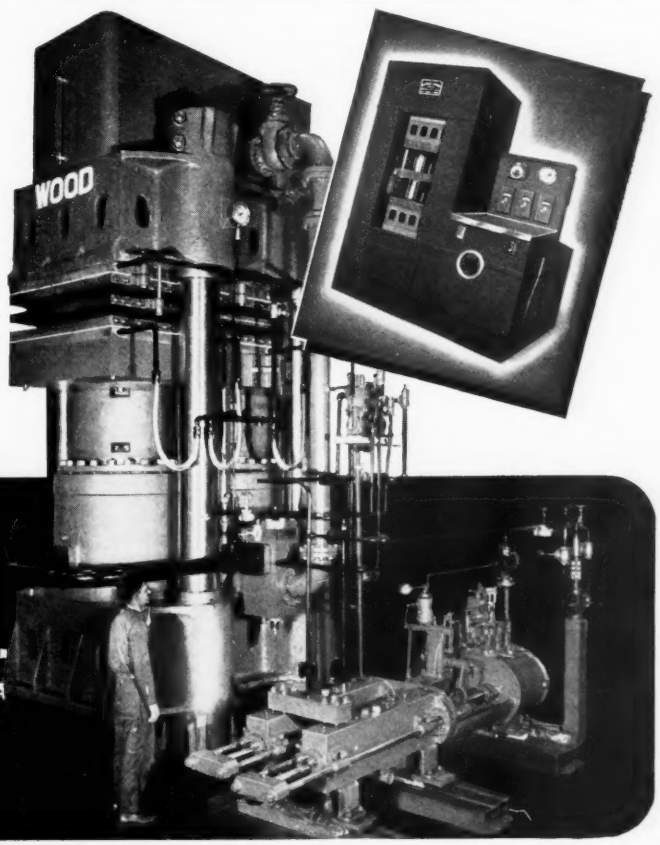

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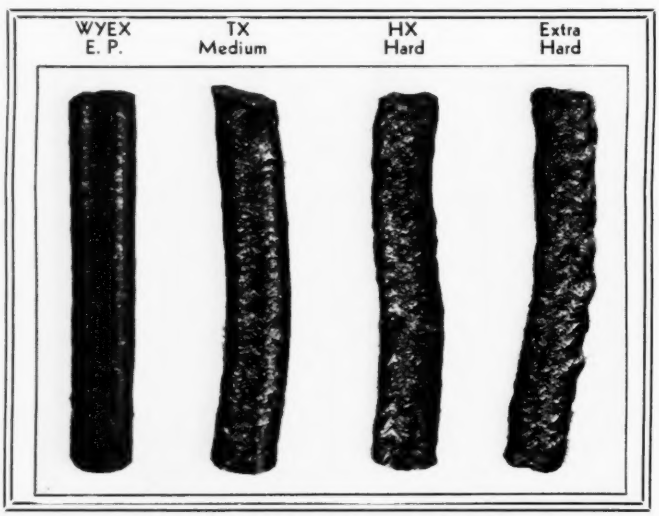

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VOLUME 108 NUMBER 2

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Volume 108 **New York, May, 1943** **Number 2**

Effect of Temperature on Resilience of Natural and Synthetic Rubber

H. C. Jones[1] and E. G. Snyder[1]

THE necessity of the substitution of synthetic elastomers for natural rubber has been forced upon the rubber compounder by the exigencies of war. His background of 100 years of research and compounding is his principal weapon for making this conversion in the shortest possible time. Too often he finds that this background fails and that practices invaluable in the development of natural rubber stocks are worthless in the case of synthetic rubber, or at least are subject to a different interpretation.

One such difference is the subject of this report. The published work of this and other laboratories[2] has shown that resilience of a rubber compound, as measured by a pendulum of the Goodyear-Healey type,[3] illustrated in Figure 1, can be correlated with the heat generated during flexing on an apparatus such as the Goodrich flexometer. This permitted the pendulum to be used as a rapid test indicative of the value of a stock designed for heavy-duty service.

That this relation would exist with synthetic elastomers appeared a likely assumption to make. Early in the work, however, exceptions were noted, and the investigation of these exceptions resulted in at least a partial explanation of the reason why hysteresis, as measured by these two methods, is not always in agreement.

Although the resilience and heat generating characteristics of the several synthetic elastomers may vary considerably, they are all poorer than natural rubber. The deficiency has caused considerable attention to be directed toward the compounding of stocks for applications where flexing and heat generation are important factors in the service life of the article. Most synthetic elastomers are more critical toward thermal effects than natural rubber, and these effects are manifested in stress-strain and tear resistance measurements at elevated temperatures as well as in hysteresis effects.

The comparison of two stocks, one compounded with Hycar OS-30, a butadiene-styrene copolymer meeting the specification (in effect November, 1942) for GR-S, the other compounded with Hycar OR-15, butadiene-acrylonitrile elastomer, showed that the pendulum resilience of the former was nearly twice that of the latter. Heat build-up tests on the Goodrich flexometer and flexing to failure on the Firestone flexometer, however, reversed this order, and the best performance was obtained with the Hycar

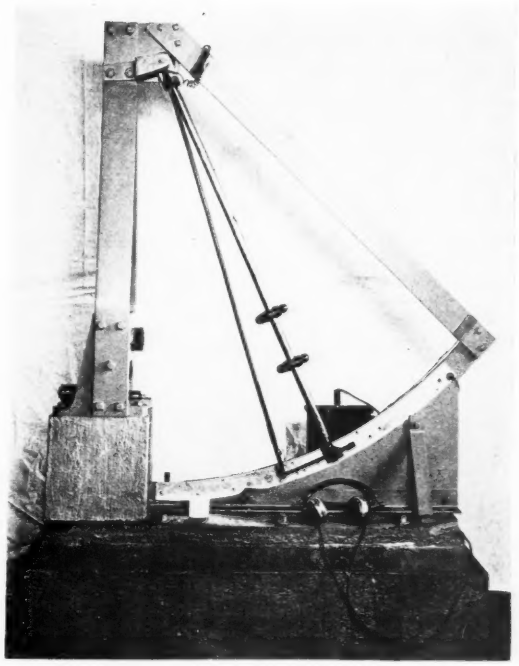


Fig. 1. Goodyear-Healey Type of Pendulum

[1] Investigators, research division, The New Jersey Zinc Co. (of Pa.), Palmerton, Pa.
[2] Barnett and Mathews, *Ind. Eng. Chem.*, 26, 1292 (1934).
[3] Jones and Pearce, "Proceedings of the Rubber Technology Conference, London, 1938," p. 830. W. Heffer & Sons, Ltd., Cambridge, England.

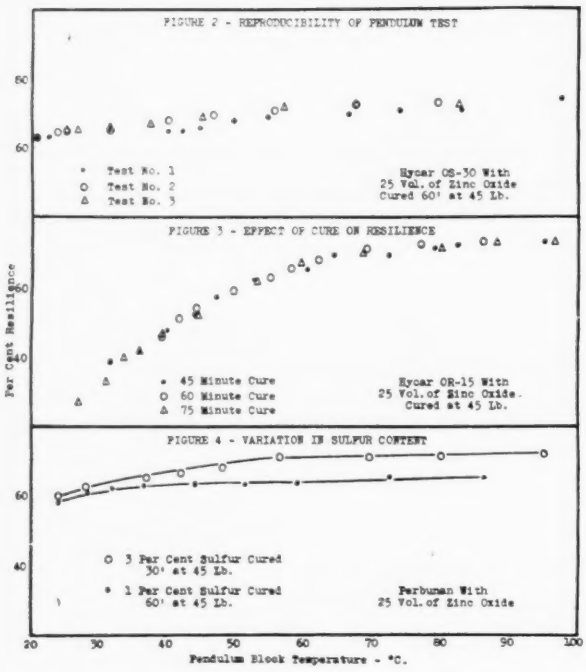


FIGURE 2 - REPRODUCIBILITY OF PENDULUM TEST
Test No. 1
Test No. 2
Test No. 3
Hycar OS-30 With
25 Vol. of Zinc Oxide
Cured 60' at 45 Lb.
FIGURE 3 - EFFECT OF CURE ON RESILIENCE
Per Cent Resilience
45 Minute Cure
60 Minute Cure
75 Minute Cure
Hycar OR-15 With
25 Vol. of Zinc Oxide.
Cured at 45 Lb.
FIGURE 4 - VARIATION IN SULFUR CONTENT
3 Per Cent Sulfur Cured
30' at 45 Lb.
1 Per Cent Sulfur Cured
60' at 45 Lb.
Perbunan With
25 Vol. of Zinc Oxide
Pendulum Block Temperature - °C.

OR-15. The most obvious difference between the two tests is that the pendulum measures the hysteresis loss at room temperature; while the flexing tests are affected not only by room temperature hysteresis, but also by the hysteresis at the elevated temperature encountered during the flexing test. Examination of the temperature rise data from the Goodrich flexing test shows that at the start of the test the heat build-up per minute of flexing for the Hycar OR-15 stock is greater than for the Hycar OS-30 stock. However after the temperature of the test piece reaches 55° C., the reverse is true, and the heat build-up per minute of flexing is higher for the Hycar OS-30 compound. This suggested a study of the resilience over a range of temperature covered by the flexometer tests.

Effect of Various Factors on Pendulum Tests—0-100° C.

In these experiments six synthetic elastomers and natural rubber were compounded in gum stocks and with 25 volumes of zinc oxide and tested for resilience on the Dunlop-type pendulum over a range of temperatures from 0 to 100° C. A fine wire iron-constantan thermocouple of the type employed in tire temperature measurements was inserted in the pendulum block (two inches by two inches by one inch) half-way between the top and the bottom and about ½-inch in from the side, in a position that would not interfere with the impact of the pendulum hammer. The pendulum blocks were heated in an oven at 110° C. for one hour; then they were mounted in the pendulum, and temperature measurements were taken periodically as the block cooled to room temperature. In order that the test sample would not cool down too rapidly, the anvil of the pendulum was preheated with a reflecting type of electric heater. The temperature range from 0° C. to room temperature was determined after the block had been cooled in a refrigerating unit to about —10° C. and resilience measurements taken as the block warmed up to room temperature.

The reproducibility of the pendulum test under the conditions of this investigation is shown in Figure 2 where the results for three duplicate runs on a Hycar OS-30 stock compounded with 25 volumes of zinc oxide are in close agreement. This degree of reproducibility of the resilience measurements was typical for the other elastomers examined.

The state of cure of a 25-volume zinc oxide Hycar OR-15 compound over the range of 45 to 75 minutes at 45 pounds (144.5° C.) did not influence the temperature-resilience characteristics of this stock (Figure 3). These results were representative of the effect of cure deter-

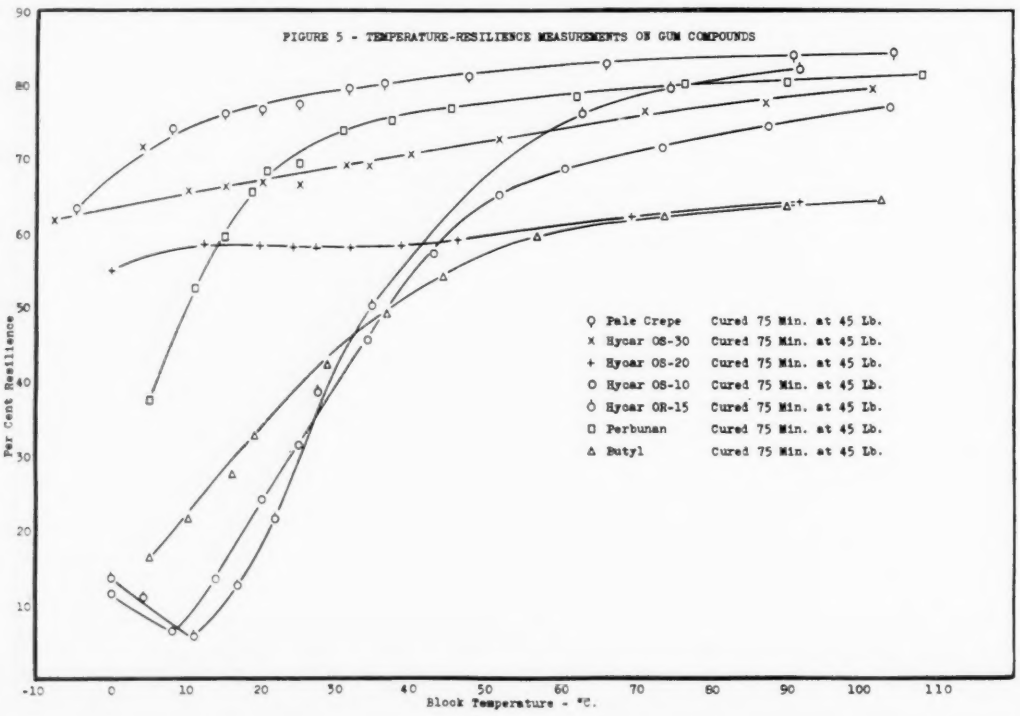
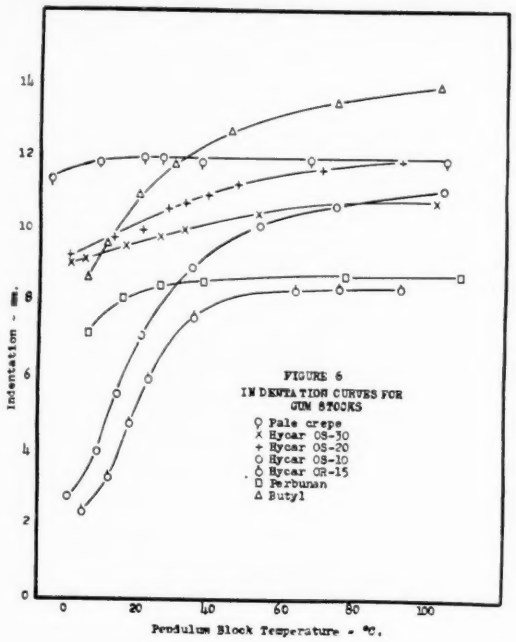


FIGURE 5 - TEMPERATURE-RESILIENCE MEASUREMENTS ON GUM COMPOUNDS
Per Cent Resilience
Pale Crepe Cured 75 Min. at 45 Lb.
Hycar OS-30 Cured 75 Min. at 45 Lb.
Hycar OS-20 Cured 75 Min. at 45 Lb.
Hycar OS-10 Cured 75 Min. at 45 Lb.
Hycar OR-15 Cured 75 Min. at 45 Lb.
Perbunan Cured 75 Min. at 45 Lb.
Butyl Cured 75 Min. at 45 Lb.
Block Temperature - °C.



mined for the other compounds. Obviously if the curing range were extended, the resilience would be affected.

Some idea of the influence of compound modification on the temperature-resilience curve is indicated in Figure 4 where data are plotted for 1% and 3% sulphur loadings in Perbunan pigmented with 25 volumes of zinc oxide. The compound with 3% sulphur has a somewhat higher resilience than the 1% sulphur stock; however, the shape of the temperature-resilience curve for both sulphur contents is the same. In the series of elastomers and natural rubber compounds all of the stocks were compounded with 3% sulphur except Butyl rubber with 2% sulphur and the 25-volume zinc oxide Hycar OR-15 compound with 4% sulphur.

Rebound and Hardness—Pure Gum and Pigmented Stocks

The synthetic elastomers and natural rubber were compounded in gum stocks, and pendulum measurements determined at comparable cures. An optimum cure or slight overcure was selected for the comparison. The pendulum measurements in Figure 5 show that natural rubber develops the highest resilience, and there is a relatively slight change in resilience over the temperature range investigated. Hycar OS-30 also has a flat or "platean" type of temperature-resilience curve, but exhibited a lower resilience than natural rubber. It is notable that Hycar OS-20, a copolymer similar to Hycar OS-30 except for fatty acid and soap content (Hycar OS-20 is essentially fatty acid-free; while Hycar OS-30 has 3% to 6% fatty acid) had a temperature-resilience curve that was also very flat, but the resilience was lower than that of Hycar OS-30. Perbunan and Hycar OR-15 developed very high resilience properties at elevated temperatures, but became much less resilient at lower temperatures. This thermoplastic tendency was also exhibited by Butyl rubber and Hycar OS-10 although the loss of resilience at low temperature was not so great with Perbunan as with Hycar OR-15, Hycar OS-10, and Butyl rubber. The inflection point on the low temperature end of the Hycar OR-15 and Hycar OS-10 curves, indicating an increase in resilience beyond this point, is not understood.

Indentation or dynamic hardness measurements for the gum compounds are plotted in Figure 6. These values were determined on the pendulum resiliometer at the same time as the resilience measurements by means of a vernier stud which contacts the lower hammer on the pendulum arm. Hycar OR-15 had the highest dynamic hardness, and Butyl rubber the lowest. The slopes of the temperature indentation curves for the several elastomers were in fair agreement with the curves showing temperature *versus* resilience.

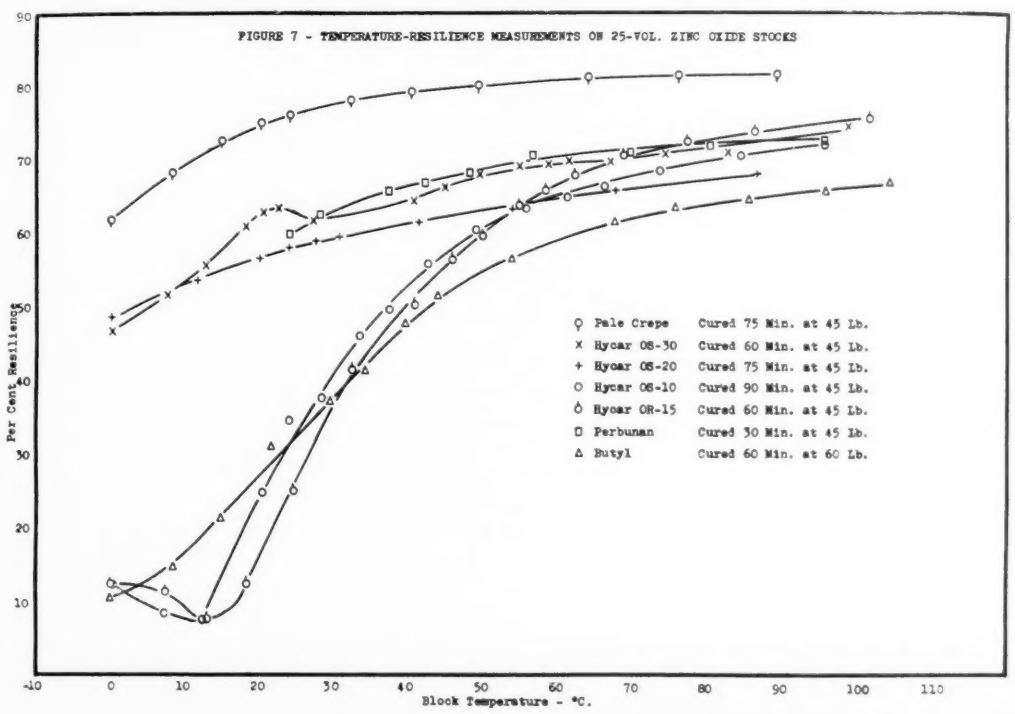


FIGURE 7 - TEMPERATURE-RESILIENCE MEASUREMENTS ON 25-VOL. ZINC OXIDE STOCKS
♀ Pale Crepe Cured 75 Min. at 45 Lb.
× Hycar OS-30 Cured 60 Min. at 45 Lb.
+ Hycar OS-20 Cured 75 Min. at 45 Lb.
○ Hycar OS-10 Cured 90 Min. at 45 Lb.
◊ Hycar OR-15 Cured 60 Min. at 45 Lb.
□ Perbunan Cured 30 Min. at 45 Lb.
△ Butyl Cured 60 Min. at 60 Lb.
Per Cent Resilience
Block Temperature - °C.

The most striking difference between the temperature-resilience curves for the gum stocks and the corresponding curves for the 25-volume zinc oxide compounds (Figure 7) is that the pigmented natural rubber compound had a distinctly higher resilience than the pigmented synthetic elastomers. A closer study of the curves in Figures 5 and 7 shows that in the temperature range of 90-100° C. a 25-volume loading of zinc oxide lowers the resilience only slightly below that of the unloaded natural rubber compound. There is a lowering of less than 5% in rebound in the case of Hycar OS-30 and Hycar OS-10, and less than 10% with Perbunan and Hycar OR-15. The Butyl rubber and Hycar OS-20 compounds, however, were in the reverse order; that is, the pigmented stocks were more resilient than the gum stocks. When the evaluations were made at 30° C., the resilience of the pigmented and gum stocks checked within 2% in the case of pale crepe, Hycar OS-10, and Hycar OS-20; Hycar OS-30, Butyl, Perbunan, and Hycar OR-15 showed greater reductions with pigmentation. The general characteristics of the curves for the pigmented stocks were essentially the same as that of the gum compounds, including the inflection points on the low temperature end of the Hycar OR-15 and Hycar OS-10 curves. The superior resilience of Hycar OR-15 over Hycar OS-30 in the temperature range from 70 to 100° C. serves to explain the Goodrich flexometer results previously mentioned, in which Hycar OR-15 had better flexing properties than Hycar OS-30.

Indentation measurements for the 25-volume zinc oxide compounds had the characteristic contour of the corresponding gum compounds, but the values were somewhat lower because of hardness which had been induced by pigmentation.

Discussion of Results

From the foregoing experiments and what is known of the chemical composition of the several elastomers, several interesting observations can be made. Except for natural rubber, the best low temperature resilience is exhibited by the elastomers high in butadiene content: namely, Hycar OS-30, Hycar OS-20, and Perbunan. The inferior low temperature resilience of Hycar OS-10 and Hycar OR-15 can be ascribed to the high percentage of styrene or acrylonitrile in these elastomers. These data suggest that the polymers high in styrene and acrylonitrile are thermoplastic and have relatively poor low temperature resilience properties. The indications are, however, that both of these materials have very good resilience at elevated temperatures. It is recognized that resilience is only one factor involved in service performance, and the effect of styrene and acrylonitrile on other properties must be considered in any final interpretation of these data. Apparently the fatty acid present in Hycar OS-30 (3% to 6% fatty acid) improves the resilience of this elastomer since it has a higher resilience than Hycar OS-20, which is understood to be the same as Hycar OS-30 except it is essentially fatty acid-free.

A very meager explanation for the observed data is made due to a lack of fundamental background as to the structure and composition of the several elastomers studied and is offered as a contribution to the fund of knowledge in the field of synthetic elastomer compounding. It is planned to continue this investigation at both low and high temperatures and attempt to correlate hysteresis with other physical properties and make an effort to isolate the factors governing both the shape and position of the temperature-resilience curve.

Rubber in the Americas

POSTWAR rubber requirements of the Western Hemisphere will far surpass pre-Pearl Harbor consumption, and the tropical Americas will be in an enviable position to supply crude rubber. So believes E. W. Brandes, head pathologist in charge of rubber investigations, Bureau of Plant Industry, United States Department of Agriculture, who returned to Washington last month from a trip begun in February through Latin America relative to emergency rubber-bearing plants. He based his expectations partly on progress in combating rubber diseases, especially as conducted at the Ford plantations in Brazil. The South-American leaf blight is being conquered by development of disease-resistant trees, crossed by hand pollination with high-yielding Far Eastern rubber trees.

Dr. Brandes visited Mexico, Guatemala, Honduras, Costa Rica, Panama, Bolivia, Ecuador, and Peru, where the U. S. Department of Agriculture is cooperating with these governments and industry to increase rubber output.[1] He conferred with employes of Rubber Plant Investigations and with officials of cooperating governments on how to make the best immediate use of available material in establishing rubber plantations in the New World.

While in Mexico, guayule attracted his attention. Under his direction indicator plantings were made in the Spring of 1942 by O. D. Hargis, and indicator plantings have also been established in Chile and Argentina by H. H. Bartlett. In Mexico the remnants of two old *Hevea* plantations, now in production, are furnishing seed on which to bud high-yielding plants. In El Palmar is also a large nursery for cultivation of high-yielding trees, where from one to two million will be readied for Mexican plantations. These trees are expected to produce from three to five times the latex given by unselected seedlings. Professor Bartlett is largely responsible for this development for shortly before Pearl Harbor he brought back from the East Indies, 175 packing cases, each containing 80 budded stumps. Some of these were also used in Haiti and Honduras.

An agreement with Mexico calls for five plantations of 700 acres each to be the outlets for the young trees in the nurseries. At economic maturity, these trees should give 800 to 1,200 pounds of rubber annually on every acre. Full production will come in about a decade, but the trees may be tapped in a gradual process after five or six years.

Honduras has a 500-acre nursery at San Alejo, which Dr. Brandes inspected; its plants will go to small farmers. Guatemala boasts 25 nurseries, operated in cooperation with private haciendas. Coffee planters there are anxious to escape dependency on coffee. The central research station in Costa Rica, run in conjunction with the local agricultural department, tackles disease control.

Panama has made rapid advancement on the rubber problem. A central station functions in cooperation with the Canal Zone experiment garden at Summit; while a nursery at Divisa is operated with the cooperation of the Panamanian Department of Agriculture. Ecuador also has cooperative nurseries. Arrangements have been made with the Ecuadoran Development Corp. for a 2,000-acre plantation at Quevedo. The Peruvian agriculture department and the Peruvian-Amazonian Corp., moreover, under a combined project plan four plantations of 600 acres each. Colombia has three plantations.

[1] See "*Hevea* Rubber Culture in Latin America" by R. D. Rands, INDIA RUBBER WORLD, June, 1942, pp. 239-43, July, pp. 350-56, Aug., pp. 461-65; also "The Production of Rubber in South and Central America" by Byron V. Crane, *Ibid.*, Dec., 1942, pp. 259-64.

Cut Growth of Buna S Compounds

A Method to Determine Rate of Cut Growth of Buna S Compounds

C. A. Carlton[1] and E. B. Reinbold[1]

BUNA S vulcanizates do not flex crack in the same manner as do those of natural rubber. So long as the surface remains unmarred the resistance to flex cracking is excellent, but when the surface is impaired by cuts or light checks, failure due to the growth of the cut takes place rapidly. This type of failure is a serious one, causing premature failure of such goods as tires and conveyer belts flexed in service. Since none of the usual methods for measuring flex cracking of natural rubber vulcanizates gave satisfactory results with Buna S, it became necessary to develop a test method before means of alleviating or overcoming this defect could be developed.

Apparatus and Test Methods

The apparatus used was the du Pont flexing machine as made by Henry L. Scott Co., Providence, R. I. This machine and the method of operation are described in A.S.T.M. Standards on Rubber Products (Method C-D430-35T), pages 78-81, November, 1939.

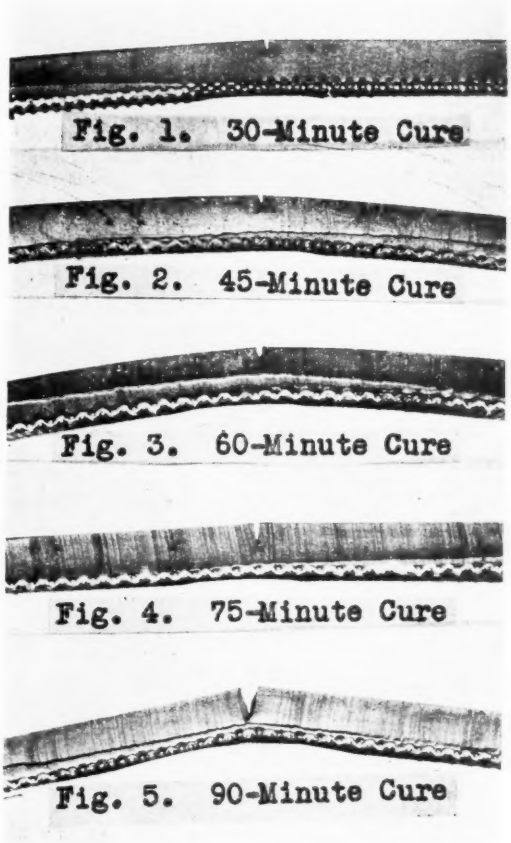
Preliminary work showed that when unaged conventional test pieces were used, failure occurred where they were pierced by the belt hooks after running 10-20 hours at room temperature. This failure was overcome by molding a one-inch wide strip of a natural rubber tread stock at each end of the test piece. Unaged test pieces prepared in this manner were run 175 hours without the development of cracks. Twenty identical test pieces which had been Geer oven aged 10 days at 80° C. were tested with extremely erratic results. One test piece failed completely at the end of 55 hours, three at the end of 94 hours, two at the end of 124 hours. At the end of 153 hours nine of the test pieces showed no cracking, while five test pieces showed varying degrees of cracking. Obviously such data were of no value.

In order to investigate the value of using test pieces that had been nicked with a razor blade, a mold was made to the same dimensions as the du Pont mold for preparing test specimens except that the corrugations were omitted and the thickness was increased to 0.275-inch. The unvulcanized stock was allowed to rest 16 hours after mixing, and then after being backed with a layer of frictioned belt fabric was molded and cured with the grain perpendicular to the 7½-inch side of the slab. The smooth cured slab, 4 by 7½ inches, was then cut into test pieces one inch wide and four inches long, the grain being parallel to the four-inch side. A razor blade cut was made across the test pieces equidistant from the ends. Preliminary work showed that a cut 0.040-inch deep gave consistent results and rapid cut growth. This depth of cut has been used throughout the work covered by this report.

Since Buna S vulcanizates show a decided loss in tensile strength and resistance to tear with an increase in temperature, the authors felt that cut growth should be measured at elevated temperature as well as at room temperature. Tests at elevated temperatures should tie in better with service results since tire treads, conveyer belts, etc., run at a temperature well above that of the surrounding atmosphere.

An oven was built around the pulley assembly of the du Pont machine. Heat is supplied by means of electric strip heaters, and circulation is obtained by means of a baffle and fan. Temperature is automatically controlled by means of a Mercoid switch. The top of the oven contains a window so that the progress of the test can be observed without removing the test pieces.

With the oven at the desired temperature the test pieces are placed on the pulleys and allowed to remain at rest for 30 minutes prior to starting the test. The test is stopped as soon as one test piece is cracked nearly through to the fabric. The depth of the crack is measured at the two sides of the test piece by means of a low power microscope, having a graduated ocular, and the two readings are averaged. Three test pieces are used for the final data. The thickness of the test piece between the bottom of the cut and the top of the fabric is 0.195-inch. Cut



Showing Effect of State of Cure on Flex Crack Growth for Compound E, Flexed Three Hours at 180° F.

[1] Development division, J. M. Huber Corp., 460 W. 34th St., New York, N. Y.

growth data is expressed in percentage of this total thickness (crack depth divided by 0.195). A flexing temperature of 180° F. was found to give sufficiently rapid crack growth for good results.

Comparison of Natural Rubber, Neoprene GN, and Buna S

The compounds shown in Table 1 were compared for rate of cut growth both at room temperature and at elevated temperature. The results obtained are set forth in Tables 2 and 3.

TABLE 1

Smoked Sheet, Neoprene and Buna S Compounds Used for Study of Cut Growth

	A	B	C	D	E
Smoked sheet	100.	....	....	....	....
Neoprene GN	....	100.	100.	....	....
Buna S*	....	....	....	100.	100.
Wyex channel black	50.	36.8	31.	50.	50.
Zinc oxide	5.	5.	5.	5.	5.
Magnesia†	....	4.	4.	....	....
Sulphur	2.75	....	....	2.	2.
Stearic acid	4.	1.	1.	2.	2.
Pine Tar	2.5	....	....	....	....
Barrett D.O. #10	....	....	....	10.	....
Turgum‡	....	....	....	....	10.
Circo Light Oil	....	1.	1.	....	....
Latac	....	.1	.1	....	....
MBT	.875	....	....	1.	1.
DOTG	....	....	....	.2	.2
Altax	....	.25	.25	....	....
PBN§	1.5	....	....	....	....

* Hycar OS-30.
† Extra-light calcined.
‡ Refined gum turpentine.
§ Phenyl-b-naphthylamine.

TABLE 2

Cure* Min.	Flexed 36 Hours at 82°F. A	B	C	Flexed 7 Hours at 82°F. D	E
30	(†)	None	None	33%	3%
45		None	None	46	4
60		None	None	55	10
75		None	None	65	10
90		None	None	70	15
105		None	None	..	15
120		None	None	..	8

* Compound A cured at 274°F. Compounds B, C, D, and E cured at 287°F. The optimum cures follow:
A = 60 min.
B and C = 45 min.
D = 60 min.
E = 90 min.
† See text.

TABLE 3

Cure Min.	Flexed 11 Hours at 180° F. A	B	C	Flexed 50 Min. at 180° F. D	E	Flexed three hours at 180°F. E
30	25%	37%	76%	12%	9%	30%
45	29	49	36	42	6	31
60	37	52	48	89	8	47
75	44	55	52	100	7	63
90	55	56	71	100	6	76
105	..	..	..	....	7	89
120	..	..	..	....	19	100

FLEXING AT ROOM TEMPERATURE. Compounds A, B, and C were flexed 36 hours at room temperature (82° F.). At the end of this period Compound A containing natural rubber developed cracks unlike those developed by Buna S compounds in that they were not perpendicular to the surface of the test piece, but turned at an angle and in some instances were nearly parallel to the test piece surface. No doubt this condition is caused by the so-called "knotty" structure of a natural rubber-carbon black compound. No appreciable differences were noted for the 30-, 45-, 60-, 75-, and 90-minute at 274° F. cures.

Compounds B and C containing neoprene showed no cut growth at the end of the 36-hour flexing period, being much superior to natural rubber.

FLEXING AT ELEVATED TEMPERATURE. When flexed at 180° F., the cracks in all compounds were perpendicular to the surface of the test piece showing that at this temperature natural rubber no longer exhibits a "knotty" structure.

Compound B containing neoprene and 36.8 parts carbon black (equivalent to 50 parts on 100 parts rubber) is approximately equal to Compound A containing natural rubber. Compound C containing neoprene and 31 parts carbon black is inferior to Compounds A and B as regards cut growth.

Compound D containing Buna S and a coal-tar softener shows extremely poor cut growth resistance. Compound E containing Buna S and an acidic-type softener is far superior to Compound D, but is decidedly inferior to either natural rubber or neoprene.

State of cure has a radical effect on the rate of cut growth of Buna S compounds. Note the rapid increase in rate of cut growth of Compound D with increase in time of cure, particularly when tested at elevated temperature. Also note the sudden increase in rate of cut growth of Compound E between the 45- and 60-minute cures when flexed three hours at 180° F. (See Figures 2 and 3.) When flexed at room temperature, Compound E shows very little difference between the various cures, but when flexed at elevated temperature, rate of cut growth increases with time of cure.

Conclusions

1. A satisfactory laboratory test method has been developed for measuring the rate of cut growth of Buna S compounds.

2. Buna S compounds are inferior to both natural rubber and neoprene as regards rate of cut growth.

3. Cut growth measurements made at elevated temperatures give entirely different results from those made at room temperature.

4. State of cure has a radical effect on the rate of cut growth of Buna S compounds; the undercures are superior to normal or overcures.

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pH Values of Phosphate Solutions[1]

A paper (RP1524) by Roger G. Bates and S. F. Acree in the February *Journal of Research* reports a series of acidity values for a number of solutions of phosphates which may be used to improve the measurement of acidity and to facilitate its control. The measurement and control of acidity and alkalinity, as explained in TNB305 (September, 1942), is of almost universal importance in industrial processes which are carried out in solutions.

This control is dependent upon accurate methods of determining acidity, or pH. The Bureau has in progress the selection and purification of substances suitable as pH standards, and is determining their values at a number of temperatures. These compounds can be used for the calibration of measuring equipment and for the regulation of acidity in the research laboratory, factory, or wherever the problem of pH control arises.

It has long been recognized that one of the most useful standards for determining pH in the region of acidity close to that of water is a mixture of primary and secondary phosphate salts. A study of 42 phosphate mixtures at 13 temperatures between 0° and 60° C. by electromotive-force methods has now been completed. The second dissociation constant of phosphoric acid and related thermodynamic quantities have been evaluated, and pH values have been assigned to each of the phosphate solutions for any temperature between 0° and 60° C.

[1] *Tech. News Bulletin*, Nat'l Bureau Standards, Feb., 1943, p. 13.

Progress in Hemisphere Rubber Plantation Development

E. W. Brandes[1]

UNDER authority given the Secretary of Agriculture by Congress in June, 1940, several logical steps have been taken to insure sound development of a plantation rubber industry in tropical America. From the beginning, active interest and cooperation by government and other agencies in 14 Latin American countries were freely given. The program was an ambitious one—nothing less than translocating half way around the world a measurable part of one of the largest agricultural industries. A better, more modern industry than the parent industries of Malaya and the Netherlands Indies was envisaged. The difficulties of the job were not underestimated. They had been brought sharply to the fore by the courageous pioneering of two commercial companies, Ford and Goodyear, who had started plantation development some years before in Brazil and Central America. Sifting and scrutinizing of the evidence already at hand, assisting in the correction of mistakes, and the perfecting of plantation planning and strategy were conceived to be a part of the contribution of the federal workers. It was hoped that in the field of biological science they would be able to make original contributions of practical value. It was appreciated that in such an undertaking, the directive force of scores of individuals would be taxed to the utmost and that success would depend upon the faith, ingenuity, and energy of many others. But in the minds of believers the game was worth the candle. The stakes appeared to be a secure source of proved, high-quality rubber, recognized by all as an indispensable material. Even at the reasonable costs estimated for producing the rubber it would add much to the purchasing power of our neighbors and customers south of the border.

Development of the Program 1941-1943

In the first year technologists of the Bureau of Plant Industry, Soils, and Agricultural Engineering carefully nursed large quantities of superior, high-yielding *Hevea* trees across the Pacific from the Far East and surveyed the primitive backwoods of the hot countries for the most promising places to develop plantations. Simultaneously, experiment stations and nurseries were launched in cooperation with the governments and other agencies in Latin American countries to study the complicated biological problems involved in disease control and to multiply the tree material. Scores of tons of selected seeds have been moved from areas with a seed surplus to other hemisphere areas suited for the development of rubber plantations. Seed generously donated by Firestone was sent from Africa. In two years time some 25,000,000 seeds have been planted to produce seedlings on which to graft the superior, high-yielding strains. Last year a beginning was made in the development of producing plantations as an outlet for the nursery material, and it is estimated that a total of nearly 20,000 acres will be developed in 1943. That is just a beginning, but granting continuation of the sympathetic government encouragement it will grow to larger proportions. The interchange of plant material and other essential work go on despite unusual, disheartening obstacles due to wartime conditions.

During the second year a program of plant improvement by breeding and selection was started and has developed to the productive stage.[2] This contemplated utilizing wild trees having desirable characteristics, especially disease resistance, to supplement the high-yielding trees procured from the Far East. All of the multitude of trees in the East stemmed from a series of seed collections in an area that represented a mere fraction of the vast Amazon Valley, and represented only a part of the full range of variability of the tree in nature. In the present project a complete reference collection assembled by original collecting in all parts of the valley was planned. Shallow draft small boats were constructed especially for the use of technologists engaged in the collecting, which is now well advanced, but much more of the large area remains to be covered.

The pathological and plant improvement investigations have confirmed that South American leaf disease, which wrote the requiem for all early attempts to establish plantations in the Americas, is no longer a bar to success. This fungus disease, which spreads rapidly when susceptible trees are concentrated in plantations and which caused devastating epidemics in the past, can be controlled by using systems of protective measures demonstrated to be applicable to any part of tropical America.

TABLE 1. SUMMARY OF *Hevea* PLANTINGS BASED ON INCOMPLETE REPORTS FROM COOPERATORS*

Country	Seed Planted in Nurseries Number		Estimated Field Plantings Acres	
	1941	1942	1942	1943
Brazil	3,000,000	2,000,000	2	1,215
Colombia	212,000	180,000	....	1,250
Costa Rica	1,776,000	1,300,000	1,200	1,300
Dominican Republic	1,000	86,000	....	30
Ecuador	36,500	60,000	....	50
El Salvador	.....	20,000	....	50
Guatemala	510,000	2,400,000	50	7,000
Haiti	3,600,000	125,000	1,500	4,000
Honduras	357,000	410,900	421	200
Mexico	1,000,000	1,500,000	....	2,000
Nicaragua	.....	105,000	....	200
Panama	19,500	10,000	10	....
Peru	23,000	200,000	....	600
Venezuela	149,500	.....	....	....

* This table gives only projected field plantings which may be realized or may be exceeded during the year indicated. Assuming 60% germination of seed, it is evident that most of the countries now have sufficient nurseries and gardens for multiplying the high-yielding clones to enable more extensive field plantings in 1944 and later.

Details of the many biological problems that had to be considered and the ways in which solutions are being worked out must await a fuller account of progress. Certain tangible results, such as the number and locations of nurseries, types and amounts of plant material now on hand and the acreage of plantations being developed this year in several countries are shown in Table 1. Problems of a different nature such as the progressive deterioration of transportation services due to the war now confront the project. Because of the need of quick transportation of the perishable seeds, budwood, and budded stumps, often for long distances, air transportation is indispensable. It has become increasingly difficult to move by the available air facilities seeds and plants, procured and

[1] Head pathologist in charge, rubber plant investigations, Bureau of Plant Industry, Soils, and Agricultural Engineering, Agricultural Research Administration, United States Department of Agriculture, Washington, D. C.

[2] "Hevea Rubber Culture in Latin America." R. D. Rands, INDIA RUBBER WORLD, June, 1942, pp. 239-43; July, pp. 350-56; August, pp. 461-65.

Fig. 1.

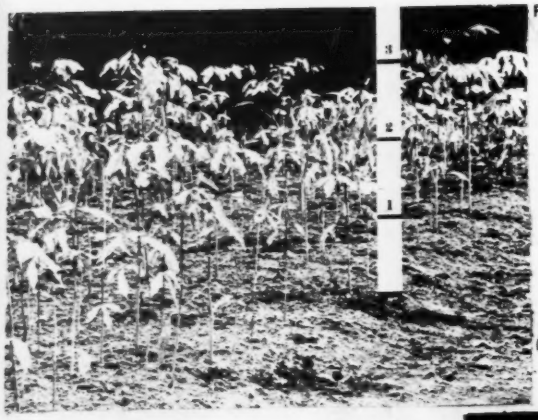

Fig. 2

Fig. 3.

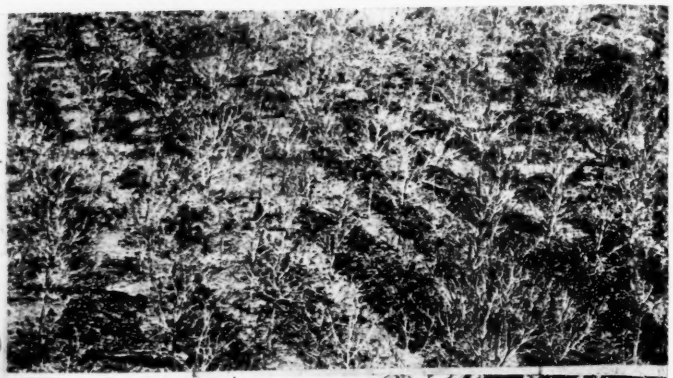

Fig. 4.

Fig. 5.

Fig. 6.

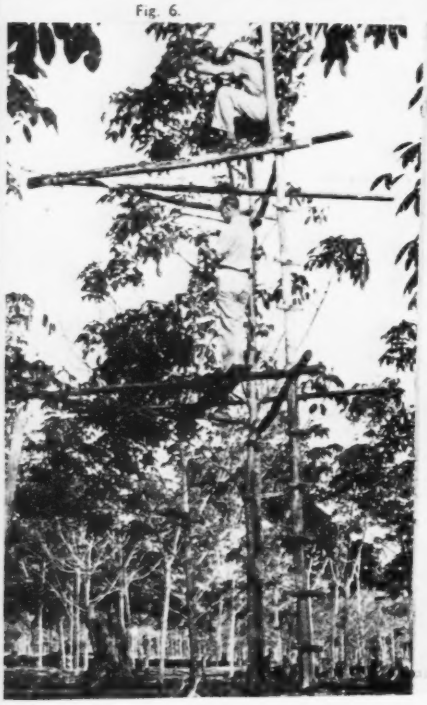

Fig. 7.

Fig. 8.

In the long run, tested performance, economical production, and secure sources are chief considerations for the army of users of rubber. Plantation rubber in the Americas is recognized as meeting these specifications for a material portion of the consumers needs.

The keystone of success in plantation rubber production is the perpetuation of selected, high-yielding strains of *Hevea* trees by budgrafting upon seedlings. Seedlings are not used directly for rubber production in modern plantations because they are likely to be variable in yield, and average production is low.

High-yielding strains of the *Hevea* trees bred in the Orient, as well as the seedlings used for root stocks, are susceptible to a fungus disease, leaf blight, which occurs in tropical America, and heretofore has stood in the way of profitable plantation rubber production.

Spectacular success in controlling leaf blight in both nursery seedlings and field plantings has been achieved in a relatively short time by bringing to bear upon the problem the resources of modern science.

The story is told in the accompanying illustrations from Central and South America. Figures 1 and 2 are nursery seedlings from seed of the same trees planted at the same time. Note in Figure 1 the destructive effect of leaf blight and in Figure 2 practical disease control by the right spray applications at the right times. Figure 3 shows complete defoliation of susceptible high-yielding budgrafted trees in a large plantation. Figure 4 shows the contrast between the susceptible budgrafted trees (*left*) and selected resistant wild trees (*right*) under test to determine yield. Already some of the latter have been found suitable for field planting. Figure 5 indicates the clew to finding such naturally resistant trees, the occasional normal individual in a badly diseased plantation. The logical next step in simplification of disease control is combining higher yield and resistance in the same strain of *Hevea*. Figure 6 shows plant breeders at work in Brazil pollinating the flowers of a resistant tree with pollen of a high-yielding strain. The resulting hybrid seedlings will be artificially inoculated with spores of the fungus, and the surviving ones will be carefully raised to tapping age for yield tests. Figure 7 illustrates the "three component tree", a temporary expedient for disease control in field plantings of susceptible high-yielding strains. After the conventional base budding for high yield a second bud is inserted at the top to provide a resistant leafy crown. Figure 8 is a field view of a plantation in tropical America developed in the modern manner.

multiplied at considerable effort, and many large, valuable shipments have been so delayed that they arrived at destination in a worthless condition. Undue delay in handling live plant material, even when carefully packed is often extremely serious, causing interruption of parts of the program in some instances and postponement for a whole season in others. In dealing with crops the appropriate time for certain operations is dictated by the season, and if neglected or prevented, a year may be lost. Since the air transportation problem became acute last autumn, and after other possibilities were carefully explored, attempts have been made to secure the exclusive use of a cargo plane as the only satisfactory solution.

Conclusion

It may be said that despite the difficulties of the times, essential progress has been made toward the objective. The necessity of using modern methods and improved planting materials has been firmly implanted in many receptive minds in the Americas; several serious biological problems such as disease do not present the terrifying aspect they once did. Material progress has been made toward disease control and toward the solution of other serious problems. The technical skills needed by plantation workers are being inculcated gradually, and, above all, a beginning has been made in translating into use the essential materials and methods on actual, producing plantations. This is essentially a long-time program, but it should be strongly emphasized that the plantation development project in Latin America has given support in many quarters to the stimulation of increased production of wild rubber needed during the war emergency. To many of our good neighbors the project gives tangible assurance of a continuing interest in a permanent industry and helps to justify immediate improvement in transportation and other facilities which otherwise might be long delayed or questionable.

The whole program has now reached the critical stage when conspicuous success, as opposed to half-hearted failure, hinges upon continued support, intelligent direction, and push. Given that, the final report can be written in terms of bales of rubber produced in the Western Hemisphere, thereby realizing the projections of a group of farseeing statesmen and scientists in all of the cooperating American Republics.

Syn-Tac Plasticizer

A new plasticizer for synthetic rubbers, particularly GR-S, is claimed to produce a fairly good degree of tackiness in this rubber. The material, called Syn-Tac and derived from heavy petroleum fractions, maintains good tensiles and elongations of 3000 to 3300 psi and 500 to 600% over the full curing range when used in amounts of about 10 parts on the GR-S in tread stocks. Tear resistance is also quite good in this rubber, and the material is reported to be effective as a dispersing agent for the other materials used in the formulations. Test made on a GR-S tire which had used the material in the compound for tread, carcass, etc., showed that as regards adhesion of plies, abrasion resistance of the tread, and uniformity of cure throughout the tire; Syn-Tac might be of considerable advantage in making tires with this synthetic rubber. More complete details of the use of Syn-Tac in tire compounding and building will be available soon from The C. P. Hall Co., Akron, O.

Compounding Neoprene Latex—II

Effect of Solvents on Films Containing Various Materials

B. Dales[1], R. H. Walsh[1] and H. H. Abernathy[1]

ONE of the outstanding characteristics of many synthetic rubbers is resistance to swelling and deterioration by solvents which are destructive to natural rubber. As might be expected, the solvent resistant synthetics differ among themselves in the degree to which they are resistant to various solvents. The degree is also greatly influenced by compounding. The positions of the dry polymer types of neoprene, E, G, GN, ILS, and FR with respect to solvent resistance have been described by Fraser and Catton,[2] Fraser,[3] and various other investigators.[4] Some data which indicate that films from neoprene latex possess the same general swelling characteristics as Neoprene Type GN have been published.[5,6] However none of the data published adequately describe the swelling character of the films from neoprene latex or the effects of compounding ingredients thereon. It is the purpose of this paper to supply data to fill this gap in the belief that it will aid rubber chemists in designing compounds for specific uses.

Test Methods Used

In the past many criteria have been used for evaluating the destructive action of liquids upon elastomers. We have chosen volume increase and retention of tensile strength after immersion as yardsticks. The methods used for determining volume increase were those outlined in A.S.T.M. Designation D-471-40T with the following modifications:

(a) The specimen thickness used was approximately 0.020-inch instead of 0.075-inch.

(b) The weighings in air after immersion were made with a Jolly spring balance instead of in tared weighing bottles.

(c) Weighings after immersion were made within three minutes after removal from the test liquid.

A.S.T.M. methods were also used to determine changes in tensile strength except for indicated variations in the time interval between removal from the immersion medium and breaking on the tensile testing machine. The kerosene used had an aniline point of 146 ± 0.5° F. PPF-813 was an aromatic fuel blend consisting of 60 parts 65-octane gasoline, 5 parts benzene, 20 parts toluene, and 15 parts xylene by volume. The other liquids used as immersion media were of technical purity. Test films were prepared from the latex compounds by the coagulating dip method using a coagulant consisting of 10 parts calcium nitrate tetrahydrate, 10 parts anhydrous calcium chloride (desiccator grade), 25 parts acetone, and 75 parts methanol by weight. Holding times for the dips in latex compounds were adjusted so that films of approximately 0.020-inch thickness were obtained. After formation the films were leached four hours in 50° C. water, dried overnight at room temperature, and cured 45 minutes at 140° C. in an air oven. It was necessary to maintain constant specimen thickness and size (surface area) throughout the series tested in order to obtain comparable results. Only specimens whose surfaces were smooth and free from pits or striations were used.

Swelling Characteristics of Basic Compound

A basis for comparison in judging the effects of various compounding ingredients was established by determining the swelling characteristics of a "gum type" neoprene latex compound. The study of such a compound containing no fillers and practically a minimum of vulcanizing ingredients, antioxidants, and emulsion stabilizing materials permitted a fair practical evaluation of the resistance of the elastomer itself to attack by solvents.

Basic Compound	
Neoprene (from Type 571 latex)	100.0
Zinc oxide	5.0
Neozone D	2.0
Aquarex SMO	1.5
*Sunaptic acid	1.0

* A mixture of naphthenic acids and oil having a saponification value of 120 to 130, sold by the Sun Oil Co., 1608 Walnut St., Philadelphia, Pa.

All weights are on a dry basis except that for Aquarex SMO, which is a liquid. The compound was prepared in the conventional manner.[6]

Table 1. Data after Immersion 24 Hours at 28° C.

	Kerosene	PPF-813	Acetone	100-Octane Aviation Gasoline	Glycerine	36% HCl	Raw Linseed Oil
Volume increase—%	64.9	240.0	46.6	65.4	3.2	12.0	69.5
Tensile strength at break—psi. Drying time* one minute	1550	800	1675	1200	2800	2975	1150
Tensile retained—%	44.0	22.7	47.5	34.0	80.0	84.4	32.6
Elongation at break—%	710	555	760	710	855	790	715
Elongation retained—%	77.2	60.3	82.6	77.2	92.9	85.9	77.7

* This refers to the elapsed time between removal from the liquid and breaking on the tensile testing machine. A one-minute drying time requires very rapid handling.

Table 2. Rate of Drying as Judged by Recovery of Tensile Strength

	Elapsed Time between Removal from Solvent and Tensile Test						
	1 Min.	2 Min.	5 Min.	30 Min.	60 Min.	5 Hrs.	24 Hrs.
Immersed 24 Hrs. at 28° C. in Kerosene							
Tensile strength—psi	1550	1550	1825	2250	2525	2825	3375
% Tensile recovered*	44.0	44.0	51.8	63.8	71.6	80.0	95.7
Immersed 24 Hrs. at 28° C. in PPF-813							
Tensile strength—psi	800	1025	1400	1925	2400	3025	3550
% Tensile recovered*	22.7	29.1	40.0	54.6	68.1	85.8	100.7

* Tensile strength before immersion was 3525 psi.

Films from this stock, which were used in obtaining the results summarized in Tables 1 and 2, had an original tensile strength at break of 3525 psi[7] and an original elongation at break of 920%. The data in Table 1 illustrate that the films from Neoprene Latex Type 571 were generally resistant to attack by liquids although less so to the aromatic solvent, PPF-813, than to largely aliphatic liquids

[1] With E. I. du Pont de Nemours & Co., Inc., Wilmington, Del.
[2] *Ind. Eng. Chem.*, 31, 956 (1939).
[3] *Ibid.*, 32, 320 (1940); 34, 1298 (1942); *Rubber Chem. Tech.*, 14, 204 (1941).
[4] D. F. Fraser, Report 42-1; other authors, Reports B1-9, B1-38, and B1-53, issued by E. I. du Pont de Nemours & Co., Inc., Rubber Chemicals Division, Wilmington, Del.
[5] H. H. Abernathy, *Rubber Age (N. Y.)*, 52, 125 (1942).
[6] B. Dales, H. H. Abernathy, R. H. Walsh, Reports 43-2, B1-44, B1-73, B1-74, and B1-75, issued by du Pont, Rubber Chemicals Division.
[7] Pounds per square inch. Throughout this paper English units are used.

like 100-octane aviation gasoline and kerosene. The neoprene films possessed good resistance to acetone, a typical ketone; to acid as exemplified by 36% hydrochloric; to glycerine, a water-like liquid; and to natural oils as represented by raw linseed oil. Since the determinations of tensile strength after immersion were made within a minute after removal from the solvents, they should truly indicate the wet strengths of the films. A comparison of the volume increase figures with the figures for tensile strength after immersion given in Table 1 shows, as expected, that with increased swelling of the films the portion of their original tensile strength retained decreases. This fact is brought out here without attempting to establish any mathematical relation chiefly in order that the volume increase figures subsequently given may have more meaning. The liquids chosen varied widely in nature and in the amount of swell produced.

Table 2 shows tensile strength-recovery data which reveal that the neoprene films dry out rapidly after removal from the volatile solvents, PPF-813 and kerosene. These results show the importance of the time interval between removal from the solvent and actual breaking on the tensile testing machine. They also are evidence that the neoprene films were not permanently damaged by the solvents.

TABLE 3. VOLUME INCREASE IN % WITH FILLERS ADDED
Films Immersed 48 Hours at 100° C. in Kerosene

Filler	Parts by Weight 10	20	50
None—101.3			
Hard clay	92.2	69.2	48.6
Lithopone	90.1	....	67.5
Natural whiting	95.4	85.0	61.5
Blanc fixe	89.0	79.1	55.2
Zinc oxide	85.7	80.0	66.0
Extra-light calcined magnesia	97.0	82.4	65.0
Hydrated aluminum oxide			
Untreated	85.5	78.4	62.2
Treated with lauric acid	72.7	68.3	60.5
Treated with stearic acid	77.8	76.8	72.0
Soft carbon black	83.0	69.2	47.5
Semi-reenforcing carbon black	84.1	73.4	62.0
Channel carbon black	76.2	61.6	....

Effect of Fillers on Swelling

A series of 10 fillers including one where a comparison of treated and untreated material could be made were chosen for study. Kerosene was chosen as the swelling medium because it is widely used to test elastomers for resistance to attack by solvents. The 48-hour immersion at 100° C. was selected instead of the less severe 24-hour room temperature test in order to obtain more nearly the maximum swelling effect. The fillers were dispersed in water by the usual methods[6] and added to the basic compound in the quantities indicated. The data obtained are shown in Table 3. Apparently the principal effect of adding fillers is one of dilution, that is, the greater the filler content the lower the swell in kerosene. The relation between quantity of filler added and decrease in swelling produced was not always linear, and no attempt to establish an exact relation was made.[8] The fillers all produced a decrease in swell, and none showed any outstanding advantage as an inhibitor of swelling. The values obtained with the three concentrations of hydrated aluminum oxide surface treated with fatty acids are relatively closer together than corresponding values for the untreated oxide and for other fillers. No explanation is at present at hand for this.

Effect of Ester Plasticizers

Table 4 shows the results of tests on 4 ester plasticizers. These liquids were emulsified in water before being added to the latex compounds. All of them except diethyl phthalate produced lowered amounts of swelling in kerosene indicating extraction. The difference between diethyl and dibutyl phthalate is probably due to the fact that the former is much less soluble in kerosene than the latter. Increasing the quantity of plasticizer does not change the amount of swelling nearly so much as might be expected. This might be due to the establishment of an equilibrium between the immersion medium and the plasticizer.

[8] The relation would be different if parts by volume had been used instead of parts by weight and if surface area effects had been taken into account.

TABLE 4. VOLUME INCREASE IN % WITH ESTER PLASTICIZERS ADDED
Films Immersed 48 Hours at 100° C. in Kerosene

Plasticizer	Parts by Weight 10	20	30
None—101.3			
Diethyl phthalate	103.8	95.6	90.8
Dibutyl phthalate	41.5	43.4	52.0
Dibutyl sebacate	59.2	46.5	43.7
Di-isobutyl adipate	68.5	66.8	....

Effect of Oils, Softeners, Wax

The data shown in Table 5 reveal the expected results in that extractable materials such as light process oil, petrolatum, paraffin wax, and soybean oil produced reduced swelling as compared with the control. Turpentine, which has a high swelling action on the neoprene of its own, but is also extractable, produced little change, probably because of the establishment of a balance between the two opposing actions. Possibly such a balance is affected in the case of the other oily materials, but the effect of extraction far outweighs their own swelling effect. It should be noted that exudation of some of the oily substances occurred when they were used in the larger quantities. However definite solubility limits were not established.

TABLE 5. VOLUME INCREASE IN % WITH OILS, SOFTENERS, AND WAX ADDED
Films Immersed 48 Hours at 100° C. in Kerosene

Material	Parts by Weight 10	15	20	30	50
None—101.3					
Soybean oil	69.4	....	57.9	....	22.7
Circo Light Process oil	62.5	51.8	40.9	31.1	....
Petrolatum	....	55.3	....	43.9	....
Paraffin wax	....	43.9	....	....	....
Turpentine	95.0	....	....	102.0	....
Brown castor oil	....	....	95.0	....	....
Cumar P-10	....	....	88.0	....	....

Conclusions

The polymer derived from Neoprene Latex Type 571 has been shown to be generally resistant to attack by solvents and to recover rather rapidly most of its tensile strength on drying after exposure to various liquids. Fillers have little more than a dilution effect on the polymer insofar as resistance to swelling by solvents is concerned. Extractable materials such as oils, waxes and plasticizers produce Neoprene Latex Type 571 stocks having lowered swelling in kerosene.

Native Sulphur in March, 1943

Although both production and mine shipments of native sulphur continued to increase in March, activity during the first quarter of 1943 was considerably lower than in 1942, according to figures released by the Bureau of Mines, United States Department of the Interior, Washington, D. C. Production increased 16% and mine shipments 5% over the February totals. Tonnage shipped to consumers was in close balance with production, as total producers' stocks dropped only 7,900 tons during the month. Compared with the same period in 1942, production during the first quarter of 1943 was 21% and mine shipments 20% lower. Producers' stocks at the end of March were 294,246 tons greater than a year ago.

Cryptostegia Grandiflora in Bloom at Gonaives

Cryptostegia Research in Haiti—I

Russ Symontowne[1]

ENCOURAGED by the federal government, large-scale plantings of *Cryptostegia grandiflora* for the production of rubber are being undertaken in Haiti and Mexico. In addition work on the plant and its latex is proceeding in many laboratories, among them those of the Department of Agriculture, the United States Rubber Co., and Massachusetts Institute of Technology.

In Haiti the planting of 100,000 acres has been entrusted by the government to a quasi-public corporation, the Société Haitiano-Américaine de Développement Agricole, known as SHADA. Last December, SHADA established a 150-acre experiment station in the arid valley of the La Quinte River near Gonaives on the west shore of Haiti. John Curtis, lately professor of botany at the University of Wisconsin, is in charge with a staff of 10 Americans and Haitians.[2]

In view of the meager literature on *Cryptostegia* as a rubber source it is felt that this preliminary report, although necessarily lacking in conclusive results, may be of value to workers elsewhere. No attempt has been made to review the botany of *Cryptostegia* or to treat the SHADA project as a whole. The endeavor here is only to describe the main lines of research at the Gonaives experiment station.

History and Description of *Cryptostegia* Plant

The plant, a native of countries bordering on the Indian Ocean, was introduced into Haiti in 1912 by a German pharmacist and botanist. It escaped from his garden near Gonaives and spread over a 500-acre area. SHADA uses these escape plants as a source of seed and experimental material.

Cryptostegia belongs to the milkweed (*Asclepiadaceae*) family, many of whose members give latex, some of which contain rubber. There are two recognized species: *C. grandiflora*, of high rubber content, and *C. madagascariensis*, containing little rubber, but much resin-like material. Since, as is well known, the plant hybridizes freely, it is probable that most individuals are intermediate between the two species. This is of great importance, as will be seen later.

Cryptostegia has two outstanding characteristics. It is extremely rugged, and it grows with astonishing rapidity. Its growth is far faster than that of any other known rubber plant.

The plant's natural habitat is in arid regions, but there is ample evidence that it grows well under a wide range of climatic conditions. It does not re-seed easily in areas of high rainfall. In regions of pronounced wet and dry seasons, *Cryptostegia* may defoliate in the dry seasons. It does not lose its leaves where there is constant aridity. It would appear that *Cryptostegia* produces a root system as long as its top growth and is thus able to stretch at

[1] Editorial staff, *New York Daily News*, 220 E. 42nd St., New York, N. Y. The *News* also kindly supplied the illustrations used in this article.

[2] The writer, from January 19 to March 13, was in Haiti studying the SHADA project. He made a number of visits to Gonaives and while there collaborated with Dr. Curtis in the present paper.

Thomas A. Fennell, SHADA President and General Manager, Holding a Five-Month *Cryptostegia* Vine at Gonaives Station

Primitive Labor, Instead of a Seed Drill, Planting *Cryptostegia* Seed near Cape Haitian

least 10 feet underground for water. A water table of from six to ten feet is believed optimum. The plant apparently has no soil preference, growing well in salty, acid, or alkali soils of almost any texture.

The seeds of the plant show remarkable viability. An average of from 85% to 90% germinate, and the seeds have the capacity to lie dormant in dry soil and to germinate when the rain comes after droughts lasting from six to eight months.

It is this high viability and resistance to drought which has led SHADA to abandon its first plan of planting seeds in nursery beds and of later setting out seedlings in the fields. Almost all present planting is by seed in the field; the nursery stock are held in reserve to fill in "skips." The seeds are covered with a half-inch of soil as it has been found that optimum coverage is from a quarter- to a half-inch. The exact depth of coverage is important. The seedlings seem to have difficulty in piercing more than a half-inch of earth; while there is danger of the wind uncovering them if they are planted too close to the surface. The present planting is in double rows a foot apart with the plants one foot from one another. The double rows are four feet apart. Two seeds are being allowed to each hole.

When supplied with plenty of water, the seedlings break through in three days and are an inch and a half tall in a month; 4½ inches tall in the next month; 12 to 14 inches after three months, and five feet high in five months. Plants a year old are 12 to 14 feet tall. The longest unsupported stem yet found at Gonaives measured 16 feet eight inches. Adult stems are capable of growing four inches a day.

The plant has two types of stems. One bears flowers and sets fruit; the other has a tendril-like character. These latter are called "tipping whips", or "T-whips", at Gonaives. If they are supported, growth is tremendously accelerated and may be as much as 14 feet a month. Such growth, however, is spindly and must be discouraged when the plant is used as a rubber source. The escape plants at Gonaives frequently climb trees, enveloping them in a mass of twisted T-whips. One such tree recently fell at Gonaives, pulled down by the weight of the vines.

Cryptostegia at Gonaives flowers in from five to seven months. The plant, however, seems to attain full growth maturity in 18 months. The maximum life of the plant is not known, but individuals of great age have been found. The flower branches set from 20 to 50 blossoms, and from 10% to 50% of these set fruits, which ripen in about four months in the form of large double pods that have led to the Creole name of the plant, "*corne a cabrit*", or "goat horns." There are from 300 to 350 seeds to the pod, and it requires from 47,000 to 49,000 seeds to weigh a pound. There is no dearth of seed, as SHADA has already purchased about 35,000 pounds gathered by peasant farmers from the escape plants.

Young plants are attacked by aphids which thus far have been easily controlled by nicotine sulphate spray. There has been some appearance of scale in older plants, but careful search among the vines in the escape valley has failed to reveal other insect pests. Entomological study is under way at Gonaives.

Cryptostegia appears exceptionally immune from disease, but there is always the high probability that under plantation conditions epidemic disease will develop, particularly as a result of tapping traumatism.

From an agricultural standpoint *Cryptostegia* is an eminently satisfactory plant. SHADA is experiencing little difficulty in getting its huge acreage planted swiftly, and there is no reason to think the plant will not flourish in its plantations.

Latex Collection and Coagulation

Between rubber in the vine and rubber aboard ship, two vital links must be forged. One is the collection of rubber in the field; the other, the processing of the rubber into sheets in a plantation factory.

Gonaives has developed an extremely simple, low-cost coagulating and sheeting process. While this may be open for improvement, it now seems entirely adequate. It is the first problem—that of rubber collection in the field—which is the great *Cryptostegia* question mark. Upon the solution of this problem depends the whole success of *Cryptostegia* as a commercial rubber source.

Many good research men have explored the possibilities of mechanically and/or chemically extracting rubber from *C. grandiflora*, and results have been uniformly negative. It can be stated categorically that no commercial process comparable to the pebble mill treatment of guayule, for example, is possible. This would appear to leave only some method of tapping, as *Hevea brasiliensis* is tapped.

But, compared to the large hole of the *Hevea* tree, *C. grandiflora* presents only its tiny stems. (A T-whip at the tapping point may have a diameter of four millimeters.) Where in a 24-hour period *Hevea* delivers latex in ounces, a *Cryptostegia* stem bleeds its few drops of latex in a matter of minutes. Moreover *Hevea* is planted about 150 trees to the acre, while *Cryptostegia* is being planted 10,000 plants to the acre. Each *Hevea* tree offers a single tapping operation every other day. Each *Cryptostegia* vine has from one stem to three stems and must be tapped daily. This means that SHADA's 100,000 acres will contain from one to three billion stems that will have to be tapped every day.

In addition both *Hevea* and *Cryptostegia* develop waste rubber which must be collected. In *Hevea* this is in the form of tree lace, dried rubber along the tapping cut which the tapper strips off and which is made into crepe rubber at the plantation factory. The cut surfaces of the *Cryptostegia* stems form small plugs of rubber which will have to be gathered and later separated from the plant material to which they adhere. Depending upon weather conditions, from one-fifth to one half the total rubber yield will be in this waste form.

It can now be seen that the tapping (or, as Gonaives prefers to call it, the "tipping") of *Cryptostegia* for SHADA is the problem of cheaply cutting from one to three billion small stems daily, bleeding the latex into vessels, and carrying vessels and waste rubber plugs to the factory.

Pilot scale tipping, just now starting at Gonaives as sufficient plants mature, may be described as follows: Wooden posts are set at regular intervals between the plant rows; each post serves for eight or more plants. The T-whips are all found on the north side of the plant because *Cryptostegia* has compass properties. The tips are brought down and held in place in a rack or clamp at the top of the post. Here the tips are conveniently exposed to the tipper's knife. Small vessels hung on the posts serve to catch the dripping latex, and these vessels may be collected at any convenient later time. Bleeding stops after about 12 minutes. The rubber plugs which form over the cut surfaces remain *in situ* and are gathered at the time of the following day's tipping. At present plugs and plant material are hand-separated to be creped locally for shipment as scrap.

Thus it will be seen that here is a multi-step operation

with each step conditioned by all the others. Among the questions Gonaives seeks to answer are: What kind of knives or other cutting tools should be used, bearing in mind the vast numbers which will be required and wartime material scarcities? What sort of vessels? What sort of posts or other supports should be used between the rows in a country where termites and post beetles abound and where lumber is not too abundant? Also, what sort of rack or clamp device?

As vexing as any other element in the problem is the matter of clamp devices which may be used to hold the stems for tapping. They must be simple, cheap, and available in quantity. They must seize and hold the stem securely with a minimum of the tipper's attention. They must release the stem just as easily so that from day to day a stem may be advanced to present new cutting points. (Present practice is to start tipping just above the second internode and to continue, removing about one inch of stem daily, until the heavy, woody portion of the T-whip is reached.)

Cryptostegia's own growth habits will add further difficulties to tipping on a plantation scale. *C. grandiflora* seedlings look not unlike small fruit trees, but, when they have reached a height of some three feet, they quite suddenly exhibit the vigorous twining characteristic of the species. The water-shoots take on a tendril character, and whatever they touch, they seize and entwine about. The floral branches too will occasionally develop twining tendencies. Thus, a full grown, untended plant growing in a field presents a matted mass of T-whips, some waving high in the air, endlessly searching for support, and others tightly wrapped about their neighbors. Adult plants at Gonaives, sharply pruned back in September, in November were a wilderness of tangled branches. It is quite apparent to Gonaives that *Cryptostegia* will have to be tipped constantly and probably, in addition, pruned, if the plantations are not to degenerate rapidly into impenetrable jungles.

The rugged quality of *Crypstostegia* plus this twining characteristic has raised the question of whether it is likely to become a plant menace to agriculture in Haiti should its cultivation be abandoned when *Hevea* rubber returns to the world market after the war. The present consensus is that it is unlikely to become a weed pest since, in nature, the plant does not spread rapidly; the conditions of optimum germination and seedling growth are rarely met. Moreover experiments show that the green plant burns readily so that fields could probably be destroyed by fire. It is also doubtful if the plant could survive extensive damage to its crown.

Gonaives has been greatly handicapped by a lack of plant material of suitable age for tipping experimentation. Before a technique can be established, its steps will have to be tested upon plants of good size growing in plantation rows. Gonaives will have such material within a short time, and it will then be in a position to intensify its tipping research.

Difficult as the tipping problem is proving, Gonaives is confident that before next January when SHADA plans to begin large scale production, it will have established a practical technique, which will certainly be involved with many more factors than those outlined above. Atmospheric conditions, for example, are being found to exercise a profound influence on the amount of latex and probably upon its rubber content. Gonaives is frequently subjected to strong, dry winds from the north which greatly lower the latex volume, probably through their dessicating influence. More latex is known to be available when a rainy night is followed by a dry, bright day.

Present data indicate that the greatest latex flow is during early morning hours, falling off during midday heat, and rising again at the approach of evening. Earlier observations on the plant indicated the contrary, that is, that the greatest yield was at midday.

(To be concluded)

Paracon—New Synthetic Rubber

A NEW synthetic rubber for specialty uses which should help meet essential war needs has been developed by the Bell Telephone Laboratories as a by-product of research on insulating materials. This new material, known as Paracon, is of the polyester type similar to Norepol, but is claimed to be superior to this earlier material in many respects. An important advantage of Paracon is that it will not compete with other synthetic rubbers for its basic raw materials, since the intermediates may be derived from a number of non-conflicting sources. Although the equipment for the manufacture of Paracon is highly specialized, it differs from that required for the production of the other major synthetic rubbers; consequently it can add to the present supply of rubber substitutes without interfering with the production of those already under way.

Paracon in its raw state is quite plastic, but may be worked on ordinary rubber machinery. The addition of fillers that will help in making the uncompounded polymer less tacky at the start of milling is advantageous. The oxide pigments are the most satisfactory fillers. In contrast to the Buna-type synthetics, carbon black is not necessary or desirable to produce best physical properties; in fact since it has some effect on the curing rate, the use of carbon black is not advised. Vulcanization is accomplished without sulphur and accelerators, which is also in contrast to natural and other synthetic rubber compounding. Paracon is unusually well adapted for use in gaskets, hose, etc., for molding into intricate shapes, and for use in the manufacture of rubberized fabrics.

Physical properties of the vulcanizates vary with the formulation, but in general a tensile strength of 1500 to 2500 psi, elongations of 400 to 600%, and a tear resistance better than most Buna compounds are obtained. The heat resistance of Paracon is claimed to be exceptional. Compounds in service at 150° C. are said to outlast both natural and synthetic rubbers. Oil and gasoline resistance are also reported as very good. Aging in air and oxygen is equal to the Buna type of synthetic rubbers and is therefore superior to natural rubber. Paracon is no better than Norepol in flex resistance and is inferior to natural rubber in resistance to steam, alkalies, and acids.

The synthesis of Paracon was accomplished by C. S. Fuller and B. S. Biggs, of Bell Telephone Laboratories, and their associates. Some months ago information as to its properties and method of manufacture was made available to the Baruch Rubber Survey Committee and to the WPB. To carry the development from the laboratory scale to that of a commercial manufacture, the Laboratories turned over to some chemical manufacturing companies full information as to the processes involved. One of these companies, The Resinous Products & Chemical Co., is now producing Paracon on a semi-commercial scale.

EDITORIALS

Draft Jeffers

EARLY in April, Rubber Director Jeffers expressed the hope that if the rubber program continued to go as well as it appeared to be going at that time, he planned to leave his present post about July 1 and return to his job as president of the Union Pacific Railroad. Repeated attempts during the past month to cut back the rubber program in spite of previous orders from highest government authorities that this program must be carried through to successful completion as rapidly as possible, should certainly have shown him how essential it is that a "man of unusual capacity and power", as recommended by the Baruch Committee, should continue in charge of the rubber program. Jeffers' record since he became Rubber Director has without doubt earned him the right to this classification.

It is probable that as a result of the unusual amount of effort that he has had to devote to maintaining the required rate of progress of the program during April, Wm. Jeffers will have decided by now that in order to make sure the program is a success, he will have to remain as Rubber Director for some time yet. However he has taken the position in the recent controversy with Under-Secretary of War Patterson that the latter's charges are so serious that after an investigation, either Patterson or himself should resign. Actually neither of these men should be permitted to resign at the present time, and as far as Jeffers is concerned, a movement should be started at once by the rubber and other industries involved in the rubber war program to see that he is induced to remain as Rubber Director, not only through this summer and fall, but until the war is ended or at least until an adequate and dependable supply of all types of rubber is assured.

The rubber procurement problem, both natural and synthetic, will not reach a steady state for many months to come, and it is difficult to see how any feeling of security as far as rubber supplies are concerned can be justified until after we have passed through that period between the Fall of 1943 and the Spring of 1944 when the natural rubber stockpile reaches its lowest point, and then the combined natural and synthetic rubber production begins to become significant. As the magnitude of the Allied offensive becomes greater and greater, there will be more attempts by the Armed Services to curtail the rubber program, but as has been stated many times before and as was again repeated by WPB Chairman Nelson in his recent appearance before the Truman Committee:

"Not a single industry in this country could operate without rubber. Without it we would be faced with absolute disaster."

It is therefore essential that we have as Rubber Director a man who can keep this important fact before him always, one who can see to it that no conditions are allowed to develop whereby we might find ourselves without the essential minimum of rubber, and preferably a man who has been with the program during its growing period so that he does not have to work under a handicap. Mr. Jeffers has demonstrated that he fulfills all of these requirements, and it is up to the rubber industry to see to it that he stays on the job until the success of the rubber program is made certain beyond doubt. We need Jeffers to continue as Rubber Director, and Jeffers needs to know first hand just how much the industry does need him.

The Industry's Postwar Responsibility

A STATEMENT made by Charles Allen Thomas, director of research of the Monsanto Chemical Co., before the general meeting of the American Chemical Society at Detroit last month should be given serious consideration by those sections of the rubber industry which have not done so already. He said that regardless of all the talk by theorists and politicians about postwar society, it will still be up to the chemist, the physicist, and the engineer to supply the new things which will be needed to solve one of the most probable and serious problems after the war—that of creating jobs for our fighting men as they return from war.

This speaker also stated that the annual capacity of synthetic rubber plants now under construction, if calculated at a value of 25¢ a pound for the rubber produced, represented an annual dollar volume of $447,000,000 for this new enterprise. No single chemical company had net sales approaching this figure in 1939. The value of rubber products manufactured in 1939 totalled $523,685,000 for tires and automobile accessories plus $341,613,427 for all other products. The combined dollar volume of the new rubber industry after the war, which should be well over a billion dollars a year, certainly should provide employment for a larger number of persons than it did before the war if new products and processes are ready at the end of the hostilities.

Expansion within the chemical industry, as Dr. Thomas pointed out, depends on research. It often takes years for a laboratory conception to graduate into a large plant reality. Research for postwar products must be initiated now. All industry, therefore, has the great responsibility of having ready definite plans so that the conversion from the manufacture of war to peacetime products can be made rapidly enough to insure a sound postwar economy.

A small number of research workers may bring about the employment of thousands of people. Therefore in their negotiations with local draft boards or the War Manpower Commission for the retention of these workers, executives in industry might give more emphasis to the fact that in addition to the much greater value of research workers to the war effort, if left in their present positions, they are also of inestimable value in providing the foundations of plans for the postwar years.

What the Rubber Chemists Are Doing

Progress and Problems of the Rubber Industry Revealed at Detroit

AS MENTIONED by Chairman John T. Blake in his opening remarks before the Division of Rubber Chemistry, A. C. S., at the beginning of the technical sessions on April 15 in the Masonic Temple, Detroit, Mich., the rubber industry is being revolutionized by the war. The problems growing out of this revolution have been, and many still continue to be extremely difficult to solve. The Chairman in a review of the situation as it existed at the Washington meeting in 1924 and the progress that had been made on the problems of that period said that although the outlook at the present time was difficult, he felt that it was not impossible. He pointed out that most of the problems of 1924 had since been solved and that in the same way he felt that in a few years we would be able to look at our present problems and find that which had seemed impossible had been solved.

Rubber Division Banquet

Judging from the attendance at and the interest displayed in the meeting of the Rubber Division, it should be classed as another one of the most successful that have been held. Attendance at the technical sessions averaged several hundred and reached a record of over eleven hundred on Thursday afternoon when the Charles Goodyear Lecture was given by L. B. Sebrell, of the Goodyear Tire & Rubber Co. Attendance at the Division banquet at the Hotel Book-Cadillac Thursday night was about 720.

This event was featured by a talk by C. F. Kettering, of General Motors Corp., on "Research in the Rubber Industry." In his characteristic and incomparable manner the speaker pointed out how some time ago as a member of a committee of the National Defense Council delegated to investigate possible substitutes for the rubber tire, he had had a part in the committee's final conclusion that there was no satisfactory substitute. Therefore the rubber and allied industries were given the tremendous job of learning how to produce and use synthetic rubber to replace natural rubber for this and many other purposes. Indicating his belief that man-made rubber would eventually be more satisfactory than natural rubber because of our ability to control its uniformity and vary its properties, he stressed the idea that we should make synthetic rubber as we thought it should be made and not merely to duplicate natural rubber. Referring to the difficulties in the development of television when the best results in transmission were obtained strangely enough when atmospheric conditions were at their worst, he admonished his audience not to bog down when the conditions were bad since working under such conditions often gave the best results. The new world of synthetics offered tremendous possibilities because it offered a new approach to our problems, he said. Commenting on post-war planning, Mr. Kettering pointed out that human nature, if it changes, does so very slowly, and any plan for the post-war world which depended on a radical change in human nature was doomed to failure in his opinion. Don't overestimate nature or yourselves in your ability to solve your problems; don't allow your ideas and thoughts to become crystallized and in a rut, if you stick to it and work you can do most anything, he told his audience in conclusion. An orchestra which had furnished music both before and during the dinner then returned and aided in the presentation of several excellent acts of vaudeville and another very successful Rubber Division banquet passed into history.

First Papers at Technical Sessions

The first paper presented at the beginning of the technical sessions on Thursday morning by Maurice L. Huggins, of Eastman Kodak Research Laboratories, gave an excellent review of the theoretical basis for the determination of average molecular weights of high polymers, including data to show agreement or disagreement with the Staudinger rule, and concluded with an outline of recommendations for the means of obtaining a better characterization of the molecular weight distribution in a given polymer. The flexing of rubber, both natural and synthetic, was the subject of two papers, one given by S. D. Gehman and one by I. H. Fielding, both Goodyear. The crystallization and fibering which may be produced in natural and Butyl rubber and which is responsible for the much better flex life of these two rubbers, cannot be produced in Buna S by any compounding methods developed to date, but may result from continued polymer research, it was stated. Information on the results to be expected from blends of "Thiokol" FA and Neoprene GN, Hycar OR, and Perbunan with respect to swell and diffusion resistance in various solvents as well as other physical properties that should be of considerable assistance to the rubber compounder was presented by S. M. Martin, Jr., of Thiokol Corp. The paper on Agripol which was to have concluded the Thursday morning session was not presented.

The Charles Goodyear Lecture

The largest audience ever in attendance at a national meeting of the Division of Rubber Chemistry, A. C. S., of more than 1,100 persons was present on Thursday afternoon to hear the Charles Goodyear Lecture delivered by L. B. Sebrell. Dr. Blake, after reviewing the events leading up to the recently adopted procedure of selecting annually an outstanding contributor to the science of rubber to lecture before the national meeting, turned the introduction of Dr. Sebrell over to A. R. Kemp. Since it was Mr. Kemp as chairman of the Rubber Division in 1939 who had proposed this means of honoring the memory of Charles Goodyear, it was particularly fitting that he should introduce Dr. Sebrell, the first person actually to deliver a Goodyear lecture. A recital of something of the life and work of Dr. Sebrell was then given by Mr. Kemp, after which the lecturer was congratulated on his being so honored and introduced to the audience.

Dr. Sebrell, in lecturing on synthetic rubber announced his title as "The Second Mile", and stated that he was borrowing the title as being the most appropriate with the permission of Dr. Wickenden who had used it for a talk on an entirely different subject. Dr. Sebrell discussed in Part 1 of his lecture the history and development of synthetic rubber from the discovery of isoprene by Williams in 1860 as a product of the pyrolysis of natural rubber and the polymerization of this monomer by Bouchardt in 1879, through the contributions of Tilden, Hoffmann, Harries, and Mathews. The commercial production of "methyl rubber" by the Germans during World War I was mentioned. The efforts in this country in the early 1920's, when we learned of the further work of the Germans and the work of the Italians on "sodium rubber", was next described. The significance of the emulsion technique of polymerization as first developed in this country and abroad in 1929 in providing a practical means for the large-scale commercial production of synthetic rubber was stressed. Present-day developments, such as the attempts to find out whether the difference in particle size of synthetic as compared with natural latices might be connected with the difference in properties between the two types of rubbers and the presence or absence of crystalline structure in natural and synthetic rubbers when examined by X-ray diffraction methods were discussed. Interesting relationships between the appearance of crystalline structure and per cent. elongation of loaded and unloaded synthetic and natural rubbers were shown.

Results of molecular weight determinations on synthetic rubbers using the viscosity method and the formula of Kemp and Peters and the ultra-centrifuge method with data furnished by the du Pont company were also shown. The question of molecular weight distribution and methods of fractionation of given samples of polymers and their effects on molecular weight determinations were discussed. Part 1 of the lecture was concluded with a description of the electrical properties and of the resilience and heat generating properties on flexing of synthetic rubbers.

In Part 2 the properties of Buna S (GR-S), Buna N, and Butyl (GR-I) rubbers, as compared with natural rubber in both a pure gum and a tread stock, were covered in an extremely comprehensive manner. The effect of milling on plasticity, the tensile and modulus characteristics of the several rubbers were shown, and the aging, flex life, tear resistance, set, etc., were all illustrated by slides, and discussed. Tests at 82° F. and 200° F. on such proper-

ties as tensile, tear, and hysteresis were given. Dr. Sebrell stated in conclusion that by virtue of remarkable cooperation between science and industry real progress in the production and use of synthetic rubber had been made and the threat of military or economic breakdown for lack of rubber was now averted.

The Business Meeting

The main item at the business meeting was the announcement of the nominations for officers of the Division for the year 1943. The nominations were duly approved, and the officers will be elected from the following list by letter balloting, and the selections announced at the fall meeting. Chairman, Harold Gray (Goodrich); vice chairman, Fred Amon (Cabot), W. A. Gibbons (U. S. Rubber), W. W. Vogt (Goodyear); secretary, H. I. Cramer (Sharples); treasurer, C. W. Christensen (Monsanto); sergeant-at-arms, M. J. De France (Goodyear), Bruce Silver (N. J. Zinc); directors, J. H. Doering (Ford), R. F. Dunbrook (Firestone), F. W. Frerichs (Cupples Co.), George Haslam (N. J. Zinc), A. H. Nellen (Lee Tire), J. H. Osterhof (Goodyear), M. G. Shepard (Naugatuck).

Other Papers

In his paper, "Thirty Years of Contributions to the Science of Synthetic Rubber", W. L. Semon, of The B. F. Goodrich Co., reviewed outstanding developments of the last three decades and gave in some detail the history of synthetic rubber development in one company, its predecessors and corporate associates. The increased need of rubber, its high price, and the uncertainty of supply caused the Hood Rubber Co. to send Richard Earle to the East Indies in 1908 to investigate the progress of growing rubber on plantations. On the way back in Paris in 1910 he met A. A. Glidden and was instructed to return to Watertown, Mass., at once and start work to develop a synthetic substitute for wild rubber. L. P. Kyriakides, working with Earle (1910-1913) on the synthesis of raw materials to be polymerized, indicated at that time that synthetic rubber could be made most readily from either isoprene, butadiene, or dimethyl butadiene and that the need of a high degree of purity of these materials was of extreme importance. Mr. Kyriakides ran into difficulties due to the rapid oxidation of his synthetic rubbers, and it was not until after extensive research on the oxidation of natural rubber (1915-1935) that the application of certain of the age-resisters developed permitted the production of synthetic rubbers of satisfactory storage stability so that they could be handled commercially. A methyl rubber produced in 1913 was found satisfactory for shoe soles, but with lower prices for natural rubber, development was discontinued.

At the same time in Akron (1910-1912), David Spence and co-workers in the laboratories of the Diamond Rubber Co., working with isoprene made from dipentene found that the successful vulcanization of this rubber could be brought about with the aid of p-amino phenol. It was finally concluded that the manufacture of methyl rubber from dimethyl butadiene was the most satisfactory method for large-scale development.

World War I, then business depression and the low price of plantation rubber discouraged any continuous work for a number of years, but in 1925 the work of H. L. Fischer on methyl rubber isomers resulted in the decision to develop synthetic rubbers, rubber isomers, or any other materials suitable for bonding rubber to metal. It was then that W. L. Semon was hired to work on this problem by H. L. Trumbull, manager of the chemical research laboratory at Goodrich at that time.

In working to produce high molecular weight products which might have a structure similar to chlorinated rubber, a thermoplastic material was developed from polyvinyl chloride which served as a basis for Koroseal. Important work done at this time by E. B. Newton and S. L. Brous on the polymerization of vinyl chloride served as a basis for further work on analogous problems. The principles of vulcanizable plasticizers and of mixed polymers were discovered and investigated by B. S. Garvey, Jr., who was also then experimenting with new types of polymers and rubber derivatives.

In 1935 because of the critical international situation developing in the East Indies, Dr. Semon was chosen to make an economic survey of the commercial possibilities for developing a synthetic rubber industry. In connection with this survey, many raw materials were synthesized and polymerized, and from his survey Dr. Semon concluded that butadiene from petroleum would be the cheapest eventual source. After a visit to Germany in 1937, he recommended the pilot plant development of butadiene copolymer synthetic rubber. This was done, and in the course of its operation it was found that when butadiene was made by passing 1,3 butandiol over a catalyst supported on natural graphite, it gave higher-quality synthetic rubber than when butadiene from other sources was used. The difference was found to be due to traces of sulphur compounds formed from impurities in the graphite, and the further investigations that followed produced that important class of compounds called "modifiers" which by their use provide better control of the polymerization process. It was at this time also that Dr. Garvey developed his "micro" compounding procedure in order that the evaluation of hundreds of polymers being made each month could be accomplished. It was stated that up to the present time about 12,000 different polymers had been investigated.

A larger pilot plant was built in 1938, and in 1939 operation at a rate of 100 pounds a day of butadiene copolymer was realized. Since butadiene from petroleum was now more readily available, the butadiene from alcohol unit was converted to the purification of petroleum butadiene. Capacity was expanded to 1,000 pounds daily in 1940, and a production plant was built and put into operation at a rate of 3,000 tons a year by December, 1940. This plant was operated by the Hycar Chemical Co., which was organized by Goodrich and Phillips Petroleum Co. in July, 1940.

In June, 1940, to focus attention on the synthetic rubber problem, Ameripol tires were offered for sale by Goodrich. Stating that the manufacture of synthetic rubber is only a means to an end and that the real problem is the assurance of tires for cars and trucks, military uses, and essential civilian items, Dr. Semon concluded that the advantages of the use of synthetic rubber lie largely in the future. Being a man-made rubber, a given type may be made with highest uniformity, and its real future lies in its ability to do a better job and perform a function which can be performed by no other material.

Peacetime prices for synthetic rubber should be less than 25¢ a pound, but it will face competition from low priced natural rubber after the war, it was said. This will be a challenge to technical men and a problem to be dealt with cautiously by our politicians and diplomats, he stated in conclusion.

In his paper on the "Vulcanization of GR-I (Butyl Rubber)", A. A. Somerville of R. T. Vanderbilt Co., described a suggested method of cure borrowed from the two-step curing technique used for hard rubber, which might provide a means of getting around the slow rate of cure of Butyl rubber. Using Tuads, Selenac, and Captax for acceleration, he showed how by using a short cure of 5-10 minutes at 312° F. to form the GR-I compound in the mold, it could then be removed, and the cure finished by heating for 24 hours at 250° F. in hot air or steam. Data were presented to indicate that although 50-60 minutes at 312° F. were required to obtain satisfactory physical properties with a single cure, the 5-10-minute cures had physical properties equal to those cured for 50-60 minutes, when both were heated for 24 hours at 250° F. after removal from the mold. The advantage of the method in obtaining higher production output per mold is obvious. Use of the method to maintain a satisfactory high rate of production of insulated wire in a continuous curing unit was also described. Data to show that satisfactory hot flow resistance of a 75% loaded stock could be obtained were given.

The paper, "Effect of Time and Temperature of Cure on Properties of GR-S Tread Stocks" by Dr. Garvey was not given.

There was considerable interest in the paper on "The Bend Brittle Point and Shatter Point of Some Rubber-Like Materials" by Glenn E. King, of the Johnson Rubber Co. It was pointed out that although the temperature at which breaking occurs on bending is different from the point at which shattering occurs, the shatter point seemed to be the true brittle point. If an instantaneous bend could be obtained, the bend brittle point would be identical with the shatter point. The need of further standardization of the testing methods for the determination of these very important properties was indicated.

Report of the Crude Rubber Committee

Pointing out that the activities of the Crude Rubber Committee have been very greatly reduced because of conditions brought about by the war, Chairman George A. Sackett, of the Faultless Rubber Co., stated that it was felt that one of the first jobs of the Committee would be to evaluate non-*Hevea* rubbers as soon as they were available in quantity. Mention was made of the necessity of study of the various syn-

thetic rubbers and rubber substitutes which might be considered as falling within the scope of the Crude Rubber Committee, but it was not considered wise to undertake such a study until certain materials are stabilized in method of production and increased in availability. The Chairman requested comment or criticism from Division members on his report in order that it might be determined how the Committee could be most useful to the Division.

Joint Luncheon Buffalo and Ontario Groups

In place of the joint meeting of the Buffalo Group, A. C. S., and the Ontario Rubber Section, Canadian Chemical Association, usually held in the spring of each year, a joint luncheon of these two groups was held at the Book-Cadillac Hotel, April 16. The event, presided over by Bert Weatherbee, chairman of the Buffalo Group, offered another excellent opportunity for exchange of ideas between American and Canadian chemists attending the A. C. S. meeting and was made of more than usual interest by the presence of the president of the American Chemical Society, Per K. Frolich, the chairman of the Division of Rubber Chemistry, John Blake, the secretary of the Rubber Division, H. I. Cramer, and prominent Canadian chemists. Dr. Frolich spoke briefly on the value of cooperation between chemists and technical men of the two countries during this war period.

Additional Papers Presented

There were many questions asked and considerable discussion held following the paper on the "Evaluation of Butadiene in the Presence of Other Unsaturated and Saturated Gaseous Hydrocarbons" by J. F. Cuneo and R. L. Switzer, of the Union Oil Co. The method which depends on the determination of total unsaturation of the gaseous mixture by hydrogenation of a portion of the sample and the percentage absorbed by a special mercuric nitrate solution in order to arrive at the percentage of unsaturates having more than one double bond was felt to be applicable in the presence of small amounts of acetylenes. The authors offered to make the details of the method known to interested parties as promptly as possible if they would write them at Wilmington, Calif.

By means of the principle of Archimedes, which states that an object immersed in a liquid displaces its own volume of that liquid, and employing helium gas to penetrate the interstices of the fine carbon black particles, very accurate measurements of the density of a number of commercial carbon blacks were reported by R. P. Rossman and W. R. Smith, of Godfrey L. Cabot Inc. Interesting information on the structure of carbon blacks was also given, and it was mentioned that the helium displacement method had shown that one of the significant differences between acetylene blacks and channel blacks was the higher degree of porosity of the acetylene black particles which were of the order of magnitude of 10,000 as compared with 200-700 for channel blacks. It was pointed out by increased knowledge of the internal structure of carbon blacks, deductions as to the cause of their activity might be arrived at.

At this point Dr. Blake referred to the coming fall meeting of the Rubber Division and requested that members give consideration to papers for presentation at this meeting in order that plans could be made as early as possible.

Interest in the paper on "The pH of Mixtures of Aqueous Soap Solutions and Monomers Employed in Emulsion Polymerization" by Charles F. Fryling and Edward W. Harrington, of Goodrich, was considerable. A decrease in pH on addition of monomer to soap solution was observed and attributed to solubilization of the monomer resulting from the formation of soap micelles [$(Monomer)_n$·R.COONa]; while an increase which occurs on further addition of monomer was attributed to solution of fatty acids in the organic phase. The phenomenon of a decrease in pH, generally observed during the course of emulsion polymerization, was pictured as a complex process. Other factors which contribute to the pH changes occurring during polymerization are oxidation, hydrolysis, and adsorption of soap by latex particles.

Solubilization of the monomer, shown to increase with increase in soap concentration, was indicated as playing an important role in the initiation of polymerization. Evidence presented indicated that the initiation may occur in the aqueous phase. It was suggested that the determination of the locus of initiation may provide a useful method for classifying so-called "emulsion polymerizations."

Papers before Other Divisions

The activities of various solvents, such as cyclohexane, benzene, toluene, carbon tetrachloride, etc., in interrupting the growth of large molecules in polymerization reactions were described in a new theory developed from experimental work done several years ago by German chemists. The paper was given by Frank R. Mayo of the United States Rubber Co., in a paper before the Division of Organic Chemistry. Indicating that these chemists had missed the significance of their results, it was stated that this new interpretation should be useful in work directed toward modifying the properties of plastics and synthetic rubber.

A report on a study of reactions which butadiene undergoes during storage and plant processing was given by Richard F. Robey, Herbert K. Wiese, and Charles E. Morrell, of the Standard Oil Development Co. The two reactions of greatest interest are: (1) dimerization by a Diels-Alder type of condensation which produces an oily substance, and (2) polymerization to materials of high molecular weight. The cyclic dimer was found not to be an intermediate in the formation of the high polymer, and although unaffected by anti-catalysts, the use of refrigeration was found to be beneficial in preventing its formation.

L. A. Group Meets

THE eighty-fourth meeting of the Los Angeles Group, Division of Rubber Chemistry, A. C. S., with about 80 in attendance, met April 6 at the Mayfair Hotel, Los Angeles, Calif., with C. Roese in the chair. After the brief committee reports Hugh A. Matier, public relations representative of Union Oil Co., spoke on "The Alaska Highway and Tomorrow's Frontier." Then Frank Durbin, of Shell Chemical Co., showed a motion picture of the plant at Martinez.

The raffle prizes, a leather case and a $25 War Bond, went, respectively, to Dick Banta and Herman Libkind. Door prizes, consisting of War Stamps, were won as follows: $3.75, R. S. Short; $5, Gaelen K. Norton, and $10, Fred S. Ehrlich. The prizes were donated by: L. H. Butcher Co. (War Bond); Walter Boswell, of Thiokol Corp. (War Stamps); Mr. Bain, of L. H. Butcher (the leather case); and Bob Abbott, of C. P. Hall Co. (table favors).

Elastic Plastics at R. I. Club

THE spring dinner-meeting of the Rhode Island Rubber Club was held at the Narragansett Hotel, Providence, R. I., April 2. The meeting, attended by more than 80 members and guests, was featured by a talk, "Elastic Plastics", by J. R. Price, of Carbide & Carbon Chemicals Corp. He began by stating that besides rubber, hundreds of new compounds possessing rubber-like properties are now being developed. Among these is the group of vinyl copolymers known as Vinylite, manufactured from high molecular weight vinyl chloride-acetate resins plus plasticizer, filler, pigment, lubricant, and stabilizer. The resins used are colorless, odorless, non-toxic, non-flammable, and extremely inert chemically, being unaffected by alkalies, oxidizing agents, and most inorganic acids. Water, alcohols, and aliphatic hydrocarbons also have no effect upon them. For compounds having the characteristics of thermoplastic rubber, 30 to 45% of plasticizers on the compound weight is used. At a comparable hardness the tensile strength of Vinylite elastic plastics generally exceeds rubber, and elongation is about 300%. Recovery on stretching is, of course, less than rubber, but this property may be used to advantage in damping devices. Flex life is about the same as rubber, and abrasion resistance, as compared with rubber and leather in shoe soles, has been found to be 30% better than rubber and eight to ten times better than leather by the Bureau of Standards, it was stated. The disadvantages of Vinylite elastic plastics are that they give service only between –50 to 180° F., and they tend to cold flow more than rubber. It was pointed out that since these materials do not require vulcanization, important economies in manufacturing operations can be realized when they are used instead of rubber.

With some machine and method changes, elastomeric Vinylite plastics can be processed on regular rubber equipment. Blending of resin and compounding ingredients is usually required before mixing on a two-roll mill or in a Banbury, although all mixing has been done successfully on a two-roll mill. Santicizer B-16, tricresyl phosphate, dibutyl sebacate, and dioctyl phthalate are the commonly used plasticizers. Mineral and carbon black fillers may be used primarily to reduce cost as no reenforcement is obtained. For specified requirements,

the filler, plasticizer, and proportions of each must be carefully selected in accordance with exact knowledge of these components and their effects to obtain desired results, it was said.

Some of the successful specific applications of the Vinylite plastics, such as calender or spreader coated raincoat fabrics, as well as sheeting for other purposes, floor mats, extruded tubes and rods, and insulating of wire and cable, were discussed. The adaptability of the materials for use in compression or injection molding was stressed. Many illustrations of processing and products were shown.

In conclusion Mr. Price emphasized that Vinylite elastic plastics are not wartime substitutes, but products developed by careful research conducted over a period of years. A Kodachrome movie of several applications of Vinylite plastics in the fashion field was shown at the end of the talk, indicating some of the post-war possibilities for the material.

Montreal Hears Nason

THE annual meeting of the Rubber & Plastics Division, Montreal Section, Society of Chemical Industry, held April 9 at McGill University Faculty Club, Montreal, P. Q., Canada, was highlighted by the presentation of "Developments in the Functional Utilization of Plastics" by H. K. Nason, assistant director of research at Monsanto Chemical Co. He stated that in many of their peacetime applications plastics were employed because of their decorative or production advantages, i. e., color, clarity, moldability, and low cost. War requirements, however, have focused attention on functional properties — strength, electrical characteristics, and endurance — and have necessitated the development of new fabricating techniques to permit the product of large sections, in relatively small quantities, but at a practical cost. Some of these newer methods were discussed, and examples of their use for the production of military components given. The speaker also offered some newer data on the strength and endurance of plastic materials, and the effect of variations in temperature and humidity on these properties was emphasized. Mr. Nason also showed many slides depicting the advances made in the last two years in accumulating comparative physical data for plastics and light metals in aircraft structure. A large number of samples, moreover, illustrated the wide application of plastics in modern aircraft.

The 55 members in attendance also heard a favorable report on the Division's financial standing and that membership for the year totaled 93, a 25% increase over 1941-42. In keeping with the policy of the organization, 11 members were elected in a body for the 1943-44 executive, as follows: H. L. Blachford, Henry Chauvin, John Dunn, W. P. B. Gedye, R. S. Jane, Wilfred Jonah, A. B. Lewis, J. H. McCready, L. C. McLeod, J. R. Mills, and E. W. Thorne. Officers will be decided upon later at a joint meeting of the retiring and incoming executive.

Northern California Plans

THE Northern California Rubber Group, Oakland, scheduled a meeting for April 29 at the Hotel Claremont, Berkeley, to hear W. D. Parrish, technical service manager for the Hycar Chemical Co., discuss "Hycar Synthetic Rubber." About 60 members and guests were expected.

Erie Accelerator

THE availability of a new accelerator reported as having shown particular merit for low hysteresis GR-S compounding for heavy-duty tires was recently announced. Called Erie, it is a liquid mixture of aliphatic thiazole disulphides with a specific gravity of 1.31, is non-toxic and non-blooming, insoluble in water, and soluble in most organic solvents and in rubber. It responds to the usual thiazole activators, and the use of one part to two parts on 100 of GR-S with 1.5 to three parts of sulphur is recommended. Use in GR-S tire and tube stocks and general mechanical goods is suggested. The Philadelphia Rubber Works Co., Akron, O.

Army Rubber Conservation

THE United States War Department, Washington, April 5 issued another release elaborating on its conservation program whereby the use of crude rubber in war material has declined 45% since Pearl Harbor. Now it is only in combat, on which depend victory and lives, and in maneuvers, which constitute instruction leading to victory, that stringent requirements for rubber economy are relaxed. By far the greatest military saving of crude rubber results from modification in design. Pedal pads and mats in trucks are eliminated; airplane vibration pads are round instead of square; polyvinyl resins replace rubber for wire and cable insulation; and ceilings are placed on the rubber content of all Ordnance Motor Transport tires by sizes.

Stringent factory inspection specifications have been relaxed to accept serviceable "seconds" in tires, and new shipping regulations are designed to offer protection against natural hazards. Conditions are set for safeguarding tires against deterioration in storage. Tires are also switched from wheel to wheel, and mounting, matching, and servicing are carefully executed. The Army issues new rubber products from storage only when worn-out tires are presented in exchange. Tires constituted 56% of the Army's rubber needs in June, 1942, but officials estimate that by next year crude rubber requirements per vehicle will be reduced 63% as compared with the amount of rubber used at the outbreak of the war.

Rubber needs for medium tanks have been decreased two-thirds. Interior padding has been cut to one-ninth. A uniform, simplified tread has been developed for armored vehicles. A minimum skid depth and a reduction in the gage of all tubes were likewise adopted. Steel wheels were substituted for rubber on portable engineering equipment.

Besides, raincoats, which formerly contained 40% crude rubber, are now almost entirely made of synthetic resin and oil-treated material. The crude rubber content of boots and overshoes has been cut about 40%, and the Army is limiting the issuance of rubber footwear to those troops who have immediate need of them. Thus the Quartermaster Corps has developed a rubber and canvas boot for tropical wear as leather is unsatisfactory in the jungle. The sole of the new boot contains both crude and reclaimed rubber and is unaffected by jungle moisture and soil chemicals; while the cloth top protects the wearer's skin.

New Adhesive to Save Rubber

THE critical shortage of crude rubber used in conventional cement led WPB, Army, and Navy to request development of an adhesive to seal protecting paper to the plastic noses of military aircraft through all handling, shipping, fabricating, and assembly, because the paper, which must strip off easily, but not self-strip, is not stripped off until the plane is ready for its initial flight. In consequence more than 100 different adhesives, most of them compounded in the laboratories of E. I. du Pont de Nemours & Co., Inc., Wilmington, Del., were tested during the year-long search for a crude rubber replacement, and eventually the du Pont plastics department developed a suitable product. It is said to stand up better than crude rubber adhesive in sunlight, and it does not "crack off" from the plastic. When aircraft production reaches its peak, hundreds of thousands of pounds of rubber will be replaced solely in masking "Lucite" methyl methacrylate resin and other acrylic plastics.

Gold Medal to Landis

The American Institute of Chemists will present at its annual meeting in May to Walter Savage Landis, vice president of the American Cyanamid Co., Rockefeller Center, New York, N. Y., its Gold Medal, awarded annually for outstanding services to the science of chemistry. It is being presented to Dr. Landis not only in recognition of his contributions to chemical engineering and development work, largely in the field of nitrogen derivatives, but also for his services to the professional side of chemistry. He has also been the recipient of the Chemical Industry Medal and the Perkins Medal.

Philip Tucker Gidley, Fairhaven, Mass., recently resigned as technical manager of Acushnet Process Co., New Bedford, Mass., to become an independent consulting technologist specializing in synthetic elastomers.

UNITED STATES

Synthetic Rubber Program under Fire Again; Buna S Patents Pooled

Important events followed each other rapidly in the rubber program during the past month, and several developments were of special interest. Appearing before the Senate Agricultural Sub-Committee at the beginning of the month, Rubber Director Wm. Jeffers exhibited the first all-synthetic truck tire made entirely from materials produced in government plants. Butadiene for the GR-S rubber was from the first carload to leave the plant operated by the Carbide & Carbon Chemical Corp. plant at Institute, W. Va.; styrene was from the first carload to leave the plant operated by the Monsanto Chemical Co. at Texas City, Tex.; and the rubber was made in a copolymer plant operated by the Goodyear Tire & Rubber Co. in Akron, O. The tire, which was of the size designed for U. S. Army "jeeps", was manufactured in the Goodyear tire plant in Akron.

Mr. Jeffers at this hearing emphasized that quantity production of synthetic rubber had not yet been realized and that the real crisis in the rubber situation was expected late this year. He defended the recent order curtailing the guayule planting program in California, which he said was done to minimize interference with the production of food crops. Since no appreciable amounts of guayule rubber may be expected for about two years, the Rubber Director explained his willingness to curtail the guayule program since the rubber shortage is not considered bad enough to take good land if it means a cut in food production.

"Let us get synthetic rubber now and quit gambling," he said.

Other advices from Washington state that the farmers objected to the guayule program because it was using valuable irrigated land. The original intent of the bill introduced by Senator Downey and Representative Anderson, of California, was to use only second-rate land, but Pearl Harbor forced the use of better land. A spokesman for the U. S. Forest Service said the situation was better than expected largely because of the use of irrigated land.

William O'Neil, president of the General Tire & Rubber Co., in a telegram to the Senate Sub-Committee recommended the transfer of the guayule project to land in Texas and Mexico where the land should be satisfactory and labor more plentiful. He stressed the value of guayule rubber for use with synthetic rubber in tire compounding in advising against too great a reduction in guayule rubber production.

Statements made by Vice President Henry A. Wallace during his recent trip through South and Central America suggesting the abandonment of government synthetic rubber plants after the war had repercussions in Congress and also resulted in a statement from Rubber Director Jeffers. Despite the necessity of protecting our recent investments in these regions by continuing to use the increased tonnages of natural rubber that would be available from these sources after the war, he said he was not in favor of "junking" the synthetic rubber plants at any time.

Further information on the scope of the activities of the Rubber Development Corp. also became available last month. More than 9,000 tappers have been transported to the Amazon rubber region, an army of more than 500 specialists is in the field; river steamers, small boats, and airplanes are in constant use for transport of men, material, and rubber, and warehouses and docks are under construction. Douglas H. Allen, now in South America observing progress and directing field operations, will confer with officials of governments in Latin America regarding plans for increasing rubber production.

Mr. Jeffers stated during the month that he had not received a report from the rubber commission which had recently returned from studying Russian methods of rubber production and processing. He also said that the Ford tire plant had not yet been shipped to Russia.

Industrial Alcohol Program

Reports that a lack of storage facilities for industrial alcohol might require a suspension of alcohol stockpiling were denied by the WPB Chemical Division. Storage capacity for 115 million gallons of industrial alcohol was said to be available in the middle of April, with about 90 million gallons actually on hand. It was announced later by the WPB at a hearing before the Senate Agricultural Sub-Committee that the five new plants recently proposed for Wisconsin, Iowa, and Illinois would not be needed since a reduction in estimated industrial alcohol requirements made it unnecessary to construct any more new plants. Walter G. Whitman said that Mr. Jeffers was not in unanimous accord with this decision, but that he had assured him that he would never lack for one gallon of industrial alcohol for synthetic rubber.

It was also announced early in the month that the first unit of a 90,000-ton GR-S plant built for the government and to be operated by the United States Rubber Co. at Institute, W. Va., had started production. Butadiene from alcohol for use in this plant is produced in an adjacent government-owned plant operated by Carbide & Carbon. This GR-S plant together with one built under the supervision of the Firestone Tire & Rubber Co. for the Copolymer Corp. at Baton Rouge, La., which also started production early in April, are the first real so-called "standard" design copolymer plants. Rubber from these plants was said to be of better quality than was, until recently, thought possible in a statement by Rubber Director Jeffers.

WPB Chairman Donald Nelson visited a GR-S plant in Louisville, Ky., built and operated by The B. F. Goodrich Co. for the government and expressed himself as amazed and encouraged by the plant, its operation, and the flow of man-made rubber he saw during his visit. His inspection also included a review of more than 500 products Goodrich had assembled in which synthetic rubber replaced all or almost all of the former natural rubber content.

A report on the rubber program issued by the OWI during the month was the cause of considerable argument between Elmer Davis, director of the OWI, and Rubber Director Jeffers. Stating that he saw no point in the publication of the OWI report which was simply a rehash of Progress Report No. 2 of the Office of the Rubber Director, which was issued February 18, Mr. Jeffers added that some of the data were old-fashioned, out-of-date, and many weeks late. Mr. Davis replied that the OWI story had been certified as correct by Jeffers' office, and it was the duty of the OWI to keep the American people truthfully informed on everything including rubber. One of the main bones of contention was that the OWI report stated that most civilian car owners could not hope to obtain synthetic rubber tires until late in 1944; while Jeffers had stated recently that the rubber program was moving along rapidly, and he felt that some restrictions could be relaxed. The Senate Sub-Committee on Agriculture voted to call both Davis and Jeffers before them to investigate the reasons for the differences between the two officials.

Standard Oil Initiates Permanent Patent Pool

In an announcement April 20 the Standard Oil Co. of N. J. revealed that it had offered to the government its patent rights on Buna S (GR-S) rubber not only for the war period, but for the entire life of the patents. The proposal was subject to approval of the company's stockholders and included the condition that the government will increase its expenditures on synthetic rubber research to a total of not less than $5,000,000. During the war the government would have the right to issue royalty-

CALENDAR

May 5-6.	AMA Production Division. Hotel Statler, Cleveland, O.
May 5-6.	SAE Natl. Transportation and Maintenance Meeting. Hotel Pennsylvania, New York, N. Y.
May 24-26.	National Association of Purchasing Agents. Annual International Convention. Hotel Waldorf-Astoria, New York, N. Y.
June 9-10.	SAE War Materiel Meeting. Book Cadillac Hotel, Detroit, Mich.
June 11.	New York Rubber Group. Building Trade Employers Assn. Clubrooms, 2 Park Ave., New York, N. Y.
June 28-July 2.	A.S.T.M. Annual Meeting. Hotel William Penn, Pittsburgh, Pa.

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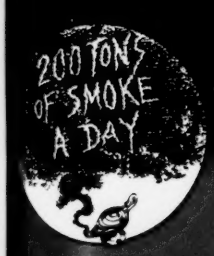

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free licenses for the entire life of the patents to everyone who cooperates with the government in its war rubber program and reciprocates with similar licenses under its own patents. It was stated that the purpose of the proposal was to give every possible incentive to cooperation in the war rubber program, to remove concern about the post-war patent situation, to encourage American research and ingenuity, and to continue to do everything possible to assure tires for America's cars—always. A letter from Rubber Director Jeffers in which he approved the proposal was made public. The Firestone Tire & Rubber Co. immediately followed with an offer to transfer its patent rights on Buna S rubber under similar conditions to the government; and the Goodyear Tire & Rubber Co. joined the pool with the statement that two months ago it had gone on record with an offer to make available all its Buna S patents for the good of the nation, and that it was now so doing, and that it viewed the developments as being very constructive. Other comments on the proposals were generally favorable, and the move was considered as of value in insuring our chances of a permanent synthetic rubber industry.

Truman Committee Investigates Rubber-Gasoline Conflict

The controversy between the Armed Services and the Rubber Director's Office broke into the open on April 22 with a request by Rubber Director Jeffers that statements made by Under-Secretary of War Patterson that synthetic rubber plant construction was reducing the output of aviation gasoline and might weaken our war effort, be investigated and the true facts made known to the public. The Senate Committee investigating the war program immediately made arrangements to call Mr. Nelson, Petroleum Administrator Ickes, Under-Secretaries Patterson and Forrestal, of the War and Navy Departments, and Rubber Director Jeffers.

On the same day it was reported that Mr. Nelson had asked that the Baruch Rubber Survey Committee be reconvened to review the rubber program, but it was indicated that Bernard Baruch did not consider such a move necessary since he felt that Mr. Nelson had all the power necessary to investigate and make any required decision on further curtailment of the synthetic rubber program.

In his appearance before this committee on April 27, Mr. Nelson denied that allocations of critical materials to the synthetic rubber program last December and in March, 1943, had resulted in such shortages as to threaten the success of the impending air offensive against the Axis. Mr. Nelson took full responsibility for these decisions, emphasizing the vital importance of rubber for civilian as well as military uses.

"Remember," he said, "not a single industry in the country could operate without rubber. Without it we would be faced with absolute disaster."

He also referred to efforts in 1940 and 1941 by the National Defense Advisory Board to interest the Army in expanding production and storage facilities for high-octane gasoline and to obtain an estimate from the Navy on its scort vessel program. It was in April, 1941, that the Army agreed to accumulate a stockpile of aviation gasoline, and not until February, 1943, that the Navy made up its mind about the escort vessel program, he said. High-octane gasoline production is up 400% since 1941, with more production in February and March than consumption, it was reported. The escort vessel program has not been delayed, and maldistribution of high-octane gasoline is a more serious problem than shortage, he said. If the synthetic rubber plant construction program were stopped now, production of high-octane gasoline would not go up for many months because it takes from 12 to 15 months to build these plants, it was stated. Asked whether he thought the relaxation on recapping and more new tires for civilians was not a poor way to conserve rubber, Mr. Nelson declared that this decision had been made by the Rubber Director's Office, and that if he found this order wasteful and non-essential, he could clamp down on rubber facilities and materials. The witness also pointed out that the crude rubber stockpile will reach the Baruch Report margin of safety late this year and said that was why the synthetic program was being pushed. If the synthetic program succeeds, a bankruptcy in rubber will be avoided, he said in conclusion.

Petroleum Administrator Harold Ickes and Under-Secretary of the Navy James V. Forrestal appeared before the Truman Committee on April 28. Mr. Ickes stated Mr. Nelson's allocation of materials to the synthetic rubber plant construction program had resulted in a loss of 4,413,600 barrels of high-octane gasoline, but that the Army would get all the gasoline this year it requested last summer in spite of this difficulty. Both Ickes and Forrestal complained of the WPB's system of overriding priorities which they claimed gave any one claimant the ability to disrupt schedules of other programs and interfere with maximum production of the national industrial machine. Both admitted, however, that it was necessary to have some one in supreme authority to decide on the allocation of critical materials to the various claimant agencies.

Rubber Director Jeffers and Under-Secretary of War Patterson are scheduled to appear before the Truman Committee on May 3 and 4, respectively, to give their views.

The United States Department of Agriculture, Washington, D. C., in FDO No. 43, effective April 1, transferred administration of WPB Order M-60, controlling the use and processing of cocoanut, babassu, palm kernel, and other high lauric acid oils, to the Food Distribution Administration. The order restricts the use of these oils to processes in which glycerine is produced, but provides exemption for any person using less than 3,000 pounds of oil per quarter. Besides the revised order prohibits any processing which will not produce the amount of glycerine required by FDO No. 33. Products of cocoanut, babassu, and palm kernel oils have many war uses, including synthetic rubber production.

The Office of Defense Transportation, Washington, D. C., has advised that fleet owners, in applying to local War Price and Rationing Boards for tires, tubes, and recapping service, need not present the unit Certificate of War Necessity covering the vehicle to be serviced. The master CWN covering the fleet is sufficient provided the owner certifies on the application form that he holds a unit certificate for the vehicle to be serviced and that he has complied with ODT tire inspection requirements.

A 60-day test of tire tread wear on over-the-road trucks was started by the ODT April 29 as part of an ODT analysis of the effect of the 35-mile speed limit on the rubber-borne transportation services of the nation. It is being conducted to determine specifically the degree of tread wear on tires of commercial motor vehicles under various speed limits. Factors contributing to rubber wear, such as loading, speed, temperature, braking and frequency of shifts will be recorded, principally through the use of automatic instruments. Results of the test will then be related to additional factors of manpower, vehicle wear, and general operating efficiency. Standards for the test, to be conducted between Baltimore, Md., and Burlington, N. C., have been developed by representatives of the ODT, the Bureau of Standards, Office of the Rubber Director, the Public Roads Administration, and The Rubber Manufacturers' Association.

To further its nation-wide vehicle maintenance program the ODT is establishing 11 sub-committees to assist and advise the District Maintenance Advisory Committees. Among the new sub-committees are those representing garages, bus lines, parts jobbers, and tire distributers.

The Board of Economic Warfare, Office of Exports, Washington, D. C., on April 12 issued Current Export Bulletin No. 89, "Program License for Certain British Empire Destinations", which covers licensing procedure for a long list of commodities including all manufactured rubber products, including tires and tubes, hose, belting, camelback, etc.

Current Export Bulletin No. 90, April 14, lists commodities deemed non-essential by Brazil, for which no licenses will be issued. Included are: rubber erasers, rubber floor mats, garters, armbands, suspenders, braces, toys, toothbrushes, household brushes, and notions.

Bulletin No. 94 contains commodities on non-essential lists of Bolivia, Chile, Colombia, and Venezuela. Bolivia and Chile cite rubber and manufactures; naval stores, gums, resins; industrial machinery; coal-tar products; chemical specialties; industrial chemicals; pigments, paints, varnishes; toys, athletic and sporting goods. Colombia mentions naval stores, gums, resins, toys, and athletic and sporting goods.

Ecuador also has published a list of non-essential imports, to be prohibited except in cases of extreme emergency. Included are rubber footwear and cement. Next Venezuela issued its list of non-essentials for which no export licenses will be granted, including coats or capes made from rubber sheets or waterproofed, chewing gums, and toys.

Rubber Goods Prices Up; Other OPA Edicts

Because higher price ceilings will be set within the next several weeks for direct and indirect sales of rubber products to the federal government, the Office of Price Administration on March 29 authorized sales agreements for future delivery of rubber products for the government to be made for prices higher than maximums now in effect. The ceilings will be raised because of increased crude rubber prices made effective April 1; therefore sales agreements including prices higher than current maximums must be for prices no higher than necessary to reflect the crude rubber price increase. No deliveries are to be made at prices in excess of ceilings actually in effect when the rubber goods are delivered. These provisions are made in amendments to five regulations effective April 1, 1943: namely, Amendment 5 to Maximum Price Regulation 300—Rubber Drug Sundries; Amendment 6 to MPR 220—Certain Rubber Commodities; Amendment 8 to MPR 149—Mechanical Rubber Goods; Amendment 7 to MPR 157—Sales and Fabrication of Textiles, Apparel, and Related Articles for Military Purposes; and Amendment 2 to MPR 119—Original Equipment Tires and Tubes.

Two other changes are made in Amendment 2 to MPR 119. One exempts from price control until June 1, 1943, tires and tubes wholly or partly of Buna S sold for the original equipment of vehicles that the War and Navy Departments, Marine Corps, Coast Guard, or Maritime Commission has contracted to buy. This action is to facilitate experiments being made with such tires and tubes and also to afford OPA time to obtain information needed before fair maximum prices can be determined for them. Only a limited volume of tires is affected. They are made of Buna S bought at high prices by rubber companies before the government fixed a price for the raw material. Control over prices by the military departments and cooperation of the departments with OPA are relied upon to keep prices for them at a fair level pending establishment of OPA ceilings.

The other change provides that the Defense Supplies Corp. pool charge may be added to prices for passenger-car original equipment tires and tubes when the seller has paid the charge. Until now tires and tubes were being newly manufactured for original equipment, and no pool charges were paid. Currently, however, the WPB prohibits manufacture of passenger-car tires and tubes for original equipment to meet current demands so that the tires and tubes are being obtained from the DSC pool.

Amendment 156 to Supplementary Regulation 14 under GMPR, effective April 2, adds commodities wholly or partly of crude rubber which are priced under GMPR to those which sellers may contract to sell at prices above their present ceilings. This provision was made in anticipation of higher ceilings to be set shortly for direct and indirect sales of rubber products to the federal government to reflect increased crude rubber prices effective April 1. While agreements may be made to sell at prices above present maximums, any excess over current ceilings must be limited to the amount sufficient to reflect the increased crude rubber prices. No actual deliveries may be made at prices higher than ceilings in effect when the deliveries are made.

None of the above actions will affect the price of rubber goods for civilian consumption.

Because prices for crude rubber, guayule rubber, and liquid latex have been established in an agreement between the Rubber Reserve Co. (sole seller of the raw materials), the Office of the Rubber Director, and the OPA, the latter on March 30 removed them from control under the General Maximum Price Regulation, by Amendment 58 to Supplementary Regulation 1, effective April 1, 1943. New prices for the raw rubber were announced by OPA on March 9, were made effective April 1 for both crude and synthetic rubber, and are based on the price of 40¢ a pound for 1X ribbed smoked sheets. Rubber Reserve will, however, continue to sell rubber for manufacture of civilian products on the basis of the present price of 22.5¢ a pound.

Amendment 2 to MPR No. 131—Camelback—effective April 13, adds camelback to the list of rubber goods that may be sold higher than current maximums. The increase, however, should reflect only the rise in raw rubber prices that occurred April 1 for goods going to the federal government. While contracts may be made for future delivery at prices above current ceilings, no deliveries may be made at prices higher than ceilings in effect at the time of delivery. As rationing regulations require dealers to keep records of camelback, Amendment 2 removes that particular requirement from the camelback regulation as being no longer required there.

Amendment 4, RPS 87—Scrap Rubber—effective April 13, reads that scrap rubber articles bought to be repaired or reconditioned to be capable of their original use need not be sold at scrap rubber prices even though the articles or materials may be acquired together with scrap rubber covered by the price schedule. Thus auto tires and tubes purchased to be repaired and used as such come under the maximum price regulation for used tires and tubes and not under the scrap schedule.

Price Revisions on Other Rubber Products

Continuing to tailor the price regulations for new rubber tires and tubes more closely to needs of the industry, the OPA on April 2 established separate maximum wholesale and retail prices for factory "second" new rubber tires and tubes for passenger automobiles and trucks. Applying to manufacturers' and private brands, the new prices are for tires and tubes less than perfect and are based on discounts of 20% for truck tires and 25% for the rest, from the maximum prices for perfect new tires and tubes. Previously there was no difference in maximum retail prices between perfect new tires and tubes and seconds. Maximum wholesale prices for the latter were calculated on the basis of the March, 1942, prices of each seller in the same way maximum prices were determined for perfect tires and tubes. While in most cases this resulted in maximum wholesale prices below those for perfect products, there was no industry-wide uniformity in the discounts required.

The new action restores for the retail prices a normal price relation between the two classes of tires and tubes that is based on discounts most generally used on the base pricing date, November 25, 1941, and the action on wholesale prices effects a desired uniformity. Study of the trade and conference with its members preceded both actions. The volume of the industry's output affected is relatively small.

The retail discounts are established in Amendment 9 to Revised Price Schedule 63—Retail Prices for New Rubber Tires and Tubes. The wholesale action is in Amendment 4 to MPR 143—Wholesale Prices for New Rubber Tires and Tubes. Both amendments are effective April 8, 1943.

Other changes made in the retail price regulation by Amendment 9 include adding specific maximum retail prices for several sizes of tire and tube brands not on the November 25, 1941, lists of their owners, which, therefore, could not be priced under the ordinary provisions of the schedule. Brands of 19 distributers of new tires and tubes also are added to lists of brands covered by specific maximum prices for base sizes.

The same amendment provides that maximum retail prices of "Safe-Ride" passenger-car tubes of the Cupples Co. shall be those on the company's November 25, 1941, retail price list filed with OPA. The standard pricing provisions in the retail schedule, OPA said, resulted in prices for these particular tubes in general higher than their November 25, 1941, list prices, and also set up abnormal price relations among sizes of the "Safe-Ride" brand.

With the issuance of the amendment, OPA republished Regulation 143 complete with all changes made by amendments.

Wholesale prices for rubber druggists' sundries when sold by dental, surgical, and hospital supply houses were removed from the rubber drug sundries regulations until June 1, 1943, except prices for Victory line rubber sundries, which consist of articles as hot water bottles subject to WPB standards. Until June the wholesale prices of the goods sold by the supply houses will be subject to the General Maximum Price Regulation, but retail prices of the same sundries they sell will continue unchanged under the rubber drug sundries regulations.

The move is one of several OPA made recently to fit the rubber sundries regulations more closely to detailed conditions in the industry. The time before June will be used for further study of pricing practices among dental, surgical, and hospital supply houses, and for investigation of claims of some houses that mark-ups in the regulation are insufficient. The postponement also enables manufacturers who have priced incorrectly goods sold to the supply houses under the regulation to revise their price lists.

The actions are taken in Amendment 4 to Maximum Price Regulation 301—Retail

and Wholesale Prices for Rubber Drug Sundries—and Amendment 4 to Maximum Price Regulation 300—Maximum Manufacturers' Prices for Rubber Drug Sundries. The amendments were effective March 26, 1943.

Manufacturers who find it impossible or impracticable to price any rubber druggists' sundry under the December 1, 1941, base date method in MPR 300 may now apply to OPA for a specific pricing method. This ruling provides for manufacturers whose operations on the base date were experimental or otherwise abnormal.

MPR 301 was amended also to free two more specifically named types of specially constructed baby feeding nipples from the requirement that no such nipples be sold at retail for more than 10¢ each or 25¢ for three. These are the "screw on" and "cleft palate" types. Also, any other specially constructed baby nipples are exempt from the same limitation even though they are not named in the regulation.

Order No. 2 under MPR 300, effective April 20, sets ceilings for the prophylactics of the Allied Latex Corp., East Newark, N. J.

Mechanical rubber goods whose rubber content is more than 50% of balata by weight are subject to the price regulation for mechanical rubber goods, because balata is now being sold at or below prices in effect October 1, 1941, the base date of the bulk of the commodities covered by the regulation. Previously mechanical rubber goods whose rubber content is principally balata were under MPR 220—Certain Rubber Commodities. They were removed from control under that regulation March 30 by Amendment 5, and transferred to control under MPR 149—Mechanical Rubber Goods, by Amendment 7 to 149. Both amendments are effective April 5. Mechanical rubber goods whose rubber content is principally balata were excluded from MPR 149 previously because balata was being sold at a price greatly in excess of that prevailing on October 1, 1941. In February, 1943, by action of the Rubber Reserve Co., balata began to be sold at prices at or below those in effect on October 1, 1941, and it is now practicable to price the mechanical rubber goods containing it under the mechanical rubber goods regulation.

MPR 358, effective April 10, sets ceilings, and means of determining them, for insulation cambric used for electrical insulating purposes, and for separator cloth used in the manufacture of rubber products or in the processing of rubber as lining or backing to separate layers of rubber and to increase or protect the adhesive qualities of the surfaces so separated. Both varnished and finished types are covered. Excluded are friction tape; any fabric covered by MPR 149—Mechanical Rubber Goods—or by MPR 220—Certain Rubber Commodities; and "retail sales", i.e., sales in small quantities to ultimate consumers for direct household consumption, and not for resale or further processing in any form. Ceilings are based on specific margins of cotton gray goods.

Amendment 6, MPR 200—Rubber Heels, Rubber Heels Attached and Attaching of Rubber Heels—effective April 20, covers maximum prices for "fiber heels" made of scrap rubber and square-woven fabrics taken from garden hose, belting, raincoats, and similar materials. Pending results of wear tests by both the OPA and the heel manufacturers, these heels are in the lowest price classification for heels made after August 31, 1942, but may be advanced if found to wear as well as rubber heels in a higher price classification. Quality standards have been adopted as the basis of price determination since, because of lack of production experience with these materials, no cost figures are available. Later, however, a more definite method of pricing may be established from the information gained through experience with these new compounds. The wearing tests, too, are described in the amendment. It also classifies the Borman Pneumatic Heel, previously unclassified, as a "super" heel.

Amendment No. 86 to RPS No. 88—Petroleum and Petroleum Products—exempts from its provisions the following:

"Special hydrocarbon fractions utilized in the manufacture of gasoline and the components thereof and liquefied petroleum gases to the extent sold or delivered for use in the manufacture of synthetic rubber: Components of synthetic rubber including, but not limited to, butadiene and styrene; all hydrocarbons and petroleum fractions used in the manufacture of the components of synthetic rubber including, but not limited to, ethylene, propylene, butylene, isobutylene, propane, butane, and iso-butane."

Amendment No. 57 to Supplementary Regulation No. 1 to GMPR exempts from its price control provisions the following when sold for use in the manufacture of synthetic rubber:

"Components of synthetic rubbers including, but not limited to, butadiene and styrene; all hydrocarbons and petroleum fractions used in the manufacture of the components of synthetic rubber including, but not limited to, ethylene, propylene, butylene, iso-butylene, propane, butane, and isobutane; hydrogen, acetaldehyde, acetylene, vinylactylene, vinyl chloride, vinyl acetate, sebacate esters, phthalate esters, tricresyl phosphate, hydrochloric acid, calcium carbide, ethylane dichloride, dichlorethyl ether, sodiumpolysulphide, butylene glycol, acrylonitrile, and ethyl-alcohol, and furfural, dehydrogenation catalysts including but not limited to chrome-alumina and magnesia-alumina dehydrogenation catalysts, and physical carrier agents for such catalysts, including but not limited to silica gel."

While most of these materials had been removed from price control provisions by previously enacted amendments, some inadvertently had been left under the regulations. Both amendments were effective April 5.

Order 3 under RPS 56, effective April 8, sets maximum prices for certain rubber reclaimed by U. S. Rubber Reclaiming Co., Inc., New York, N. Y., for The Sponge Rubber Products Co., Derby, Conn.

Order 404 under 1499.3 (b) of GMPR, effective April 19, approves maximum prices for sales of cements, adhesives, stains, finishes, and comparable chemical products by the B. B. Chemical Co., Cambridge, Mass.

Rationing Regulations Amended

Amendment 10 (April 21) to Ration Order 6—Men's Rubber Boots and Rubber Work Shoes—exempts from rationing regulations over-the-knee olive-drab, clay, and khaki colored rubber boots. Such footwear, however, is no longer being made because of the rubber shortage, and this action permits the existing supply to be sold ration-free provided the seller files a revised inventory eliminating these boots, used in hunting and fishing.

Also added to the list of rationed rubber footwear eligibles is anyone engaged principally in washing motor vehicles used as common or contract carriers or vehicles used in wholesale delivery of essential commodities. Also eligible are workers in beverage and bottling plants who need the protection of rubber footwear, but these workers are limited to lightweight short rubber boots.

The following amendments were recently added to RO 1A—Tires, Tubes, Recapping and Camelback. No. 19 (originally effective April 15, but changed to April 9 under the twenty-first amendment) permits tire dealers or persons selling or servicing farm equipment who need rear-wheel tractor tires for their customers to get stocks for this purpose. The amendment also allows dealers with the replenishment portions of rationing certificates calling for truck tires to restock with tires suitable for farm equipment instead; however a tractor tire cannot be substituted for a truck tire. Because of a shortage in some sizes of truck tubes, permission is granted the holder of a certificate calling for a truck tube to purchase a passenger-car tube.

Amendment 20, effective April 6, excuses vehicle manufacturers from reporting inventories of unmounted tires and tubes to the OPA since they must make similar reports periodically to the WPB. Also, a tire dealer or manufacturer may repossess tires, tubes, or camelback he has transferred under a conditional sales contract or chattel mortgage without first getting OPA authorization for the repossession. However the recovery must be reported within ten days to the OPA state or district office.

Amendment 22, effective April 13, makes retail milk delivery vehicles eligible for replacement tires when their casings are not recappable. Previously eligible only for recapping services, they could not get replacements for worn-out tires.

The twenty-third amendment, effective April 15, provides a closer check against bootlegging and violations of tire inspection requirements. The Tire Inspection Record for each car must be in the vehicle while in operation so that a check of the recorded serial numbers against the tire numbers can be made at any time. A tire inspector will report any serial number irregularities to the local War Price & Rationing Board that issued the record rather than the board that appointed him. Also, when an applicant for a tire or tube does not have a record showing all inspection requirements have been met, the local board may still grant the application

if an inspection has been made within 60 days prior to its filing. Besides dealers need not hold tires turned in by replacements buyers for the full 30 days previously required if, before that time, the tires are examined by an OPA representative and their disposal is authorized. The representative may require the tires be held longer than 30 days. This period gives OPA field men opportunity to check up on the work of inspectors when replacements are recommended. All turned-in tires must now be segregated from other tires, and a tag attached giving tire serial number, date turned in, the certificate holder turning the tire in, and the serial number of the certificate. These tires must be kept ready for inspection by OPA examiners.

Under the twenty-fourth amendment, effective April 19, farm veterinarians may get new tires as replacements even when their casings are recappable; they are also eligible for two mud and snow tires besides their ordinary tires to make their travel easier and safer in inclement weather. The next amendment removes after May 1 the distinction between tires in Grades I and II, and thereafter all new passenger-car tires, those manufactured before Pearl Harbor and the reclaimed rubber casings made since, will be designated Grade I. Passenger-car drivers with mileage of more than 240 monthly will then be eligible for any grade of new tire when their present casings are not recappable. As before, motorists with monthly mileage of 240 or less are eligible for used or recapped tires—Grade III—when they need replacements. This action was adopted following the advice of the Rubber Director that supplies of Grade II tires (formerly for those in the 240-560 monthly range) were inadequate to meet needs; while there were more Grade I tires in relation to the number of eligibles for that grade.

Amendment 26, to conserve rubber by providing recapping as soon as needed, removes, May 1, quota restrictions on the number of truck tire recapping certificates that may be issued monthly. Also stricken from the regulations is the rule that certificates for recappings or inner tubes for List B trucks can be issued only after the twenty-fifth of the month and then only if List A needs have been met.

Car-sharing offers an efficient, economical and necessary means of wartime transportation, Rubber Director Jeffers declared April 1 in a statement supporting a program set up by the OPA and the Office of Civilian Defense to help the nation's car owners form car clubs to save rubber. This new program gives impetus to car-sharing requirements that have been a part of mileage rationing since its inception. To obtain supplemental rations of gasoline for occupational travel, applicants must arrange to carry three or more other persons to work regularly, or to show that it is impossible for them to do so.

Rubber Director Jeffers in a letter, April 5, to Price Administrator Prentiss M. Brown emphasized that automobile travel throughout the country must be limited as far as possible to essential driving to avoid serious trouble before synthetic rubber can supplant the rubber we now have. Refuting the current notion that "there is no longer need for conserving rubber", Mr. Jeffers suggested that rationing boards be admonished "to curtail driving, as nearly as possible to that which is essential." The Rubber Director also stressed that 1943 is the critical year for bridging the gap between the rubber we now have and the date when enough synthetic rubber will be available to take care of at least essential driving.

Tire and Tube Quotas

The allotments of tires, tubes, and recapping services that Rubber Director William M. Jeffers assigned for rationing in April were broken down into quotas on a district basis, rather than on the state basis used heretofore. The total of quotas for all 109 districts is directly comparable with March totals for the 48 states and the District of Columbia. However since some of the districts cross state lines and include fragments of two or more states, there is no accurate basis for comparing the April figures for the individual districts with the quota as reported for each state separately in March.

District quotas of Grade I passenger-car tires for April totaled 506,000, against 321,827 in March. Grade I's are the best quality tires, available for necessary replacements on cars with a mileage ration of more than 560 miles monthly. The April quota of Grade II tires, of a lower quality for which passenger cars with mileage above 240 monthly are eligible when their casings are not recappable, was 552,000, compared with 253,000 for March. The quota of used and recapped tires, Grade III's, available for needed replacements on cars with mileage of 240 monthly or less, was 598,000 for April, against 644,000 in March. These increases reflected the changes in eligibility effective April 1, and the greater seasonal demand for necessary tire replacements.

April truck tire quotas were 368,000, against 299,000 in March, and truck recapping service quotas, 552,000, against 460,000. The farm tractor and implement tire allotment of 59,800 for April was the same as for March.

Inner tube quotas for passenger cars amounted to 736,000, against 735,914, and for trucks to 338,100, against 292,100.

Additional OPA Regulations

Supplementary Order No. 40, effective April 2, emphasizes the point that repeal, revocation, or modification of any price regulation does not release any person from liabilities or penalties incurred under the regulation before it had been changed.

Revised Supplementary Regulation No. 1, effective April 22, regroups under a single order exemptions of commodity transactions from the General Maximum Price Regulation.

Amendment 143 to SR 14 to GMPR relates to maximum prices for sulphuric acid sold on long-term contracts.

Amendment 1 to MPR 28—Solvents—effective February 27, covers maximum prices for ethyl alcohol. Amendment 2, effective April 1, clarifies the formula for ethyl alcohol in computing the cost of sales to the government.

Amendment 29, RPS 53—Fats and Oils—effective April 6, covers prices for certain tallows and greases sold in specified containers to several manufacturing businesses, including: adhesive, automobile, battery, belting, cement, chemical, defoaming compound, radio, rubber, and wire and cable.

Order 31 under RPS No. 57—Wool Floor Coverings—effective April 6, establishes maximum prices for Stair Carpet No. 2 of the Thermoid Co., Trenton, N. J.

Amendment 17, MPR 118—Cotton Products—effective April 5, sets ceilings for certain gray insulation tubing.

Amendment 7, Ration Order 17—Shoes—effective April 5, provides, under certain conditions, that for the convenience of workers who need safety shoes on short notice, employers may issue purchase certificates for these shoes to any employe who has spent his ration stamp 17.

Office of Lend-Lease Administration, Washington, D. C., in its report of April 19 on shipments to North Africa since the United Nations landed there, revealed that $405,000 worth of tires and tubes have been sent in the first four months there.

Navy Saves Rubber

The United States Navy also has embarked upon a rubber conservation program that is showing gratifying results in its quest to spin out dwindling national stocks of crude rubber by substituting synthetics and other materials. Greatest need of rubber is on shipboard where hose, gasketing, and various insulating devices normally require rubber. Now, however, nearly all mannings on deck, formerly of rubber, are of resins. Besides crude rubber for electrical packings, deck coverings, and certain types of life preservers and rubber rafts have been replaced by guayule or synthetic rubber.

In power cables, plastics have almost completely replaced rubber. In certain products, though, only partial substitution is advisable; and in the case of gas masks and other articles demanding extremely high stretching quality, crude rubber continues to be used exclusively.

Navy officials estimate that two million pounds of crude rubber is being saved by the Bureau of Aeronautics by substituting reclaimed and synthetic rubber in airplane self-sealing tanks. Some of the figures follow: self-sealing hose, 350,000 pounds of crude rubber in 1943, by using synthetic rubber; aviation flying boats, wading, and rain suits, suit bags, life jackets, oxygen equipment, and life rafts, 350,000 pounds of crude, by using substitute materials; parachute seat cushions, 500,000 pounds, by using hair for rubber. The Bureau has outlined a program for 1943 expected to save 400,000-500,000 pounds of rubber in radio and electrical equipment alone. That saving, however, depends upon the applicability of a new plastic, found satisfactory in laboratory tests, as a 100% replacement of hard rubber battery cases and separators.

Nearly all these savings, moreover, are financial too.

Rubber Orders Revised; Additional WPB News

Amendment 5 to Supplementary Order M-15-b, as Amended December 28, 1942, effective April 13, removes restrictions on the destruction of rubber insulated wire and cable to enable more efficient recovery of the copper content of such materials. The amendment relaxes the procedure whereby firms recovering copper from wire and cable were formerly compelled to reclaim the rubber content or make application for its destruction. The amendment also permits destruction, under special authorization, of certain types of scrap rubber, including tires, casings, and tire tubes which have no value so far as the rubber conservation program is concerned. The amendment, moreover, allows manufacturers who because of limited facilities had to send their rubber to other companies for washing, drying, and milling to do so without first applying for the transportation of the rubber provided actual title does not change hands.

Supplementary Order M-15-b, relating to rubber and balata and products and materials of which they are components, complete with all amendments up to and including April 15 has been reprinted in consolidated form.

To avoid confusion in consequence of the change in the price of crude rubber on April 1, the Office of Rubber Director on April 22 emphasized that all federal government purchases have been consolidated under the heading "War Orders." This information is contained in Amendment 1 of the "War Order Definition" of Supplementary Order M-15-b, as Amended April 13, 1943. The dual price structure is divided to cover "War Orders" and "Civilian Orders"; the former carries a crude rubber price of 40¢ a pound, and the latter 22½¢ a pound.

Supplementary Order M-15-f as Amended April 17, 1943—Restricting the Use of Rubber Cements and Adhesives—sanctions the covering of wood shoe heels, for which, it is expected polyvinyl acetate will be used and not latex. The use of polyvinyl acetate will continue subject to allocations, but since under the conditions of the original M-15-f these allocations were limited to permitted operations, the amendment was necessary to authorize the covering of heels.

Supplementary Order M-15-g—Rubber Tires for Industrial Power Trucks—was amended April 12 to extend the replacement for use period on applications for new power truck tires from 15 to 30 days. The order, as amended, also contains several additional changes, all of a technical nature and designed to clarify the definitions described in the original order.

Inasmuch as provisions of Conservation Order M-119, which prohibited the use of rubber jar rings or rubber sealed closures in packaging a number of products, have been incorporated in Conservation Order M-104, Order M-119 was revoked March 30 by the WPB. Order M-119, issued April 9, 1942, was intended to prevent the use of rubber in packaging a number of products where it was not deemed to be essential. Conservation Order M-104 specifies the limits within which closures for glass containers can be used for packaging foods, health supplies, chemicals, household and industrial products, and beverages for civilians.

Conservation Order M-104, as Amended April 10, 1943—Closures for Glass Containers—allows a large number of foods to be commercially packed in glass in unlimited quantities for civilians this year. The WPB Containers Division estimates enough metal and rubber will be available for closures for the additional products permitted under the revised order. No person, moreover, may sell or deliver any closure made wholly or partly of tinplate, terneplate, blackplate, wire, rubber, or waste material except the purchaser accompanies his order with a certification that the material will not be used in violation of M-104. Rubber is allowed for the first time for baked beans. Medicine bulbs and stoppers, by a restating of the definition of "closures", are excluded from the order.

With the issuance of Order L-143-a, all rights to acquire, manufacture, deliver, recondition, and rebuild rubber processing machines and equipment have been placed under the control of the Office of the Rubber Director. All manufacturers and dealers in rubber processing machinery and equipment must file lists of unfilled orders on their books as of March 26 and obtain authorization of the WPB before deliveries can be made. No such machinery may be produced without authorization after April 9.

Prior to the issuance of this amended order, all tire processing machinery and equipment had already been placed under allocation. This new order, L-143-a, however, now covers specifically 81 types of processing machines and equipment. Insulated wire and cable machinery, mechanical goods equipment, and drug and surgical sundries machinery are included as well as machinery for manufacturing rubber footwear.

General Limitation Order L-143, which covered tire and tube processing machinery and equipment only, will be revoked as of April 9, 1943, and will be superseded by the new amended order L-143-a.

Limitation Order L-192, as Amended April 9, 1943—Construction Machinery and Equipment—includes under its limitations such products as rubber-tired mounted power cranes, except freight handling lift trucks; certain pumps; rubber-tired mounted power shovels; and road pneumatic-tired rollers; in fact, any new equipment designed for or requiring rubber tires, but excluding any equipment on rubber-tired chassis or running gear built for or usable for the transportation of commodities or persons. Also, in the making of any equipment or repair parts no fabricated rubber products may be used where the use of other less critical materials will not impair the efficiency or operation of the item. The Order defines rubber as "all kinds of natural, reclaimed and synthetic rubber."

Personnel Activities

The Office of the Rubber Director on April 5 announced return of the mission sent to the USSR last November at the invitation of that government to study Russian technique in the production of synthetic and natural rubber. The four-man mission, consisting of Ernest Dittman, Aristid Grosse, Irvin L. Murray and Willis A. Gibbons, landed in this country the beginning of April. Their plans call for extensive conferences with technicians of the Office of the Rubber Director and mutual discussions with the reciprocal Russian Mission now in this country to study American synthetic rubber manufacture.

Chester F. Conner, merchandise manager of the industrial products sales division, B. F. Goodrich Co., is on the staff of advisers on mechanical rubber goods in the Office of the Rubber Director.

Arthur Newhall, formerly rubber coordinator, on April 5 was appointed executive director of the Combined Production & Resources Board to supervise and control the work of the Board's combined staff and to exercise general direction of the work of the various committees set up to make special studies and reports. This appointment marks the establishment of a new post of executive director responsible to the Board as a whole and not to any one of the constituent national parts of the Board. Mr. Newhall's appointment also completes the organization which the Board has developed to meet its responsibility to coordinate and integrate the productive resources of the United States, the United Kingdom, and Canada.

WPB recently named 157 war workers as winners of national honors for suggestions increasing and improving production. Among the 53 winners of awards of Certificates of Individual Production Merit were Charles H. Miller, Robert A. Nourse, and Stanley H. Martin, all of the Goodyear Tire & Rubber Co., Akron, O. Among the 104 recipients of Letters of Honorable Mention were Frank D. Gilmore, Mary E. Brown, Alexander Thomson, Joseph A. Wiper, Robert N. Snyder, C. E. Robinson, and Herman E. Hewitt, also all of Goodyear.

Charles E. Volkhardt, executive vice president of Harvey Hubbell, Inc., Bridgeport, Conn., has been made director of the Facilities Bureau, WPB, succeeding Fred Searls, Jr., who returned to the War Shipping Administration. The Facilities Bureau determines the relative essentiality and urgency of facilities and construction programs to assure the maximum use of existing industrial units.

George S. Ujlaki has been made Supervisory Price Analyst, Consumer Durable Goods Branch, with supervision over housewares, hardware, mill supplies, radios, musical instruments, sporting goods, bicycles, batteries, and related miscellaneous items. He comes to the OPA from the BEW where he was identified with the Rubber Division.

Restrictions Increasing

Fixtures for plastics molding machinery were put under control by Allocation Order L-159, as Amended March 26, 1943. Also the definition of plastics molding machinery was clarified by adding "cera-

mic injection molding presses or machines capable of being used for plastics" and "plastic tablet preforming molding presses or machines."

Conservation Order M-297, issued March 30, beginning May 1 restricts delivery and use of coal tar.

General Limitation Order L-111—Hand Trucks and Other Handling Equipment—was amended April 13. Under the original order the use of rubber tires on such equipment was limited to essential needs. This restriction has been retained, but with some broadening of permitted exceptions. Among other revisions is: purchasers of equipment in which any restricted item (and rubber or rubber tires) are used must certify why the exceptions are applicable.

General Limitation Order L-193, as Amended April 5, 1943—Conveying Machinery and Mechanical Power Transmission Equipment—contains as one of its provisions that no steel or rubber liner plates shall be used in steel chutes or steel spouts.

General Preference Order E-10, issued April 13, limits production and inventories of anti-friction bearings.

General Preference Order M-154, as Amended March 26, 1943, revises the list of civilian products for which thermoplastics may no longer be used.

General Preference Order M-227, as Amended April 6, 1943, relates to copper chemicals and their use in a wide variety of industries such as: preservatives, dyes and pigments, heat pads, electric batteries, and synthetic rubber.

A shortage of casein has necessitated the issuance April 14 of General Preference Order M-307, restricting its production. Among the industries affected are adhesives, coated paper, paint, plastics, and rubber.

Limitation Order L-270—Material Entering into the Production of Maintenance Equipment for Passenger Automobiles, Light, Medium, and Heavy Trucks, Truck Tractors, Truck Trailers, Passenger Carriers, and Off-the-Highway Motor Vehicles—issued April 5, restricts production and sales of such equipment, including tire air pressure gages and pumps and brake lining appliers.

Preference Rating Order P-132 was revoked April 1 and replaced by Utilities Order U-4, which covers wire telegraph, cable or related communications service (exclusive of telegraph and teletypewriter service rendered by operators of telephone communications systems). The order relates to the use of CMP materials.

Priorities Regulation No. 13, dealing with the sale of idle, excess, or frozen materials by persons not regularly engaged in selling such materials, was amended April 7 further to tighten control over materials. A principal change was to put various government agencies and persons buying for their account on the same basis as other users and purchasers. But sales to certain government corporations, as the Commodity Credit Corp., Defense Supplies Corp., Metal Reserve Corp., and Rubber Reserve Co., for stockpiling purposes still are permitted. Among the scarce materials affected are aluminum, several forms of copper, rubber, and various chemicals.

Supplementary Order M-170-a, effective May 1, places polystyrene under allocation.

Allocation Order M-10, as Amended April 20, 1943, allows use and delivery of 50 pounds or less of vinyl polymers monthly, exempts from WPB authorization acceptance of, delivery, and use of vinyl polymers for experimental purposes and delivery of vinyl polymer scrap to producers or scrap dealers, and excludes from the order acrylic resins as defined in M-260.

Allocation Order M-260 as Amended April 19, 1943—Acrylic Monomer and Acrylic Resin—removes restrictions on the use, processing, delivery, or acceptance of acrylic resin scrap except on specific WPB direction. Changes have also been made in instructions for making application for acrylic monomer or acrylic resin. Uses covered include for adhesives, coatings, and synthetic rubber.

Conservation Order M-157 on April 19 was changed to Allocation Order M-157, which, as amended, increases the amounts of chemical cotton pulp exempt from WPB authorization.

General Preference Order M-258, as Amended March 27, 1943—Mineral Oil Polymers—carries the following change: "The Petroleum Administrator for War or the Deputy Petroleum Administrator for War may take any action with respect to this Order, or with respect to any person affected by this Order, which may be taken by the War Production Board."

General Preference Order E-5-a, issued March 26, makes it easier for machinists and other workers to obtain new gages and precision measuring hand tools needed in their employment. The WPB also revoked General Preference Order E-5 as of May 1, 1943, since its subject matter is covered after that date by Order E-5-a.

Copper Order M-9-c restricts, but does not completely prohibit the use of copper in hot water bottles, syringes, ice caps, bulbs, and other "rubber hospital sundries." If the copper or copper base alloy was acquired before June 30, 1942, it may be used for these sundries only on orders rated AA-4 or higher; yet a manufacturer may apply to WPB on Form PD-426 for authorization to fill lower-rated orders. Copper material acquired after June 30, may be used without a preference rating if the use of a less scarce material is not practicable; the use of more copper material or copper of a higher grade than required for proper functioning of the article to be manufactured is forbidden.

Materials Savings Reported

An annual saving of two million tons of critical materials and untold tonnage of other essential materials, including rubber, is being made through restrictions and curtailments of production of hundreds of civilian household goods, according to the WPB Consumers Durable Goods Division in a recent report reviewing conservation actions within its own administration up to January 1, 1943. Among the estimated annual savings of rubber appear the following: pedal bicycles, 3,300 tons; electrical appliances, 1,400 tons; portable electric lamps, 1,000 tons; domestic electric refrigerators and others, four tons; fountain pens, mechanical and wood-cased pencils, pen holders, 400 tons; outboard motors, 15 tons; vacuum cleaners, 1,000 tons; domestic washing machines and ironers, 4,700 tons.

The Containers Division in a report of the conservation of substantial tonnages of steel, tin, and cellophane by the substitution of paperboard containers revealed that one adhesive tape manufacturer by adopting a cardboard spool container saved 429,000 pounds of metal for the war effort.

The Conservation Division on April 8 announced that wool felt is a satisfactory substitute for rubber, and the former is being used in making washers, gaskets, and a variety of intricate parts formerly produced of rubber. Thus during the past half year about 500,000 pounds of rubber have been saved. Whereas oils, greases, solvents, heat, dryness, sunlight, and ozone cause rubber to deteriorate, they have comparatively little effect on the life or quality of the felt. Where a part must be waterproof, or where there is contact with dirt which would spoil the inherent resiliency of the felt, the felt part may be rubber coated. These rubber-coated felt precision parts, however, consume only a fraction of the rubber which would normally be required for all-rubber parts, but at the same time perform essentially the same service. In both liquid and solid coating applications, a synthetic rubber may be used.

The WPB has directed canners to pack in large No. 10 cans, to the greatest possible extent, rather than in smaller containers, the fruits, vegetables, and juices required to reserve in 1943 for the armed forces, lend-lease, and other government agencies. Such action is expected to save several thousand tons of critical materials including 43 of rubber.

The WPB Salvage Division has extended its chemical products reclamation program to make sure that no valuable chemical resources, as solvents and cleaners, cutting and lubricating oils, paints and chemical by-products, are lost. One thousand users of chemical products have been asked to report briefly on their reclamation practices, and their experience will be passed on to plants still wasting chemicals.

The Alien Property Custodian, Washington, D. C., has announced that 400 titles of individual technical books and sets of books of Axis origin are available for republication in furtherance of the war effort. Included are volumes on aviation, gas warfare, physics, chemistry, and other technical subjects. Their titles were suggested by leading American scientists and librarians.

Rohm & Haas Co., Philadelphia, Pa., is constructing its second plant for the manufacture of acrylonitrile, used in the manufacture of Buna N synthetic rubbers. The new $300,000 plant, expected to be completed soon, will make four acrylonitrile plants in operation in this country. The company's first such plant was opened in 1940.

OHIO

Goodrich Elections

Stockholders of The B. F. Goodrich Co., Akron, gathered in annual meeting in New York, N. Y., April 20 and reelected the following directors for three-year terms: Thomas H. McInnerney, Wesson Seyburn, Sir Walrond Sinclair, and Langbourne M. Williams, Jr. Later the directorate met to reelect all officers for the coming year: chairman of the board, David M. Goodrich; president, John L. Collyer; vice presidents, T. G. Graham, J. J. Newman, and G. W. Vaught; secretary, S. M. Jett; treasurer, L. L. Smith; and controller, T. B. Tomkinson.

Stockholders also heard Mr. Collyer predict that next year would see substantial sales of synthetic rubber tires to civilians, if we continue to receive rubber from India and Ceylon. Present restrictions relating to rubber, however, should not be relaxed until the country is safely past the low point, probably late in 1943, in the national rubber stockpile. Answering a question, Mr. Collyer said that production of synthetic rubber has progressed enough to confirm the company's opinion before the Senate Military Affairs Committee in 1940 that the synthetic could be produced in quantity at 25¢ a pound; Goodrich expects further reductions in cost. The company, moreover, continues to advocate standby synthetic plants and firmly believes that the nation never again should have to depend wholly upon distant sources for its rubber supply.

Robert V. Yohe, technical superintendent, chemical division, is now plant manager of the government synthetic rubber plant operated by Goodrich in Kentucky. Dr. Yohe, in the rubber industry since 1931, joined Goodrich as a research chemist and has held several important research and production positions in various divisions of the company. He succeeds J. W. Frasche, named plant manager at another government synthetic plant in Texas, which will also be operated by the Goodrich company.

Jay E. Miller and Harold F. Mosher have been made, respectively, sales promotion manager and manager of industrial merchandise of the industrial products division, according to W. S. Richardson, the division's general manager. Mr. Miller previously had been in charge of advertising and sales promotion of druggists' sundries; while Mr. Mosher, with Goodrich 24 years, lately had been manager of the trade coordination department.

John L. Collyer, Goodrich president, has been named a member of the National Industrial Information Committee governing board, according to Alfred P. Sloan, Jr., chairman of General Motors Corp. and chairman of the special industrial committee.

Burton F. Stauffer, assistant general manager of the industrial products sales division, celebrated his fiftieth anniversary with the company last month. He was honored at a luncheon of company executives and presented a beautiful clock and other gifts by President Collyer.

The Interstate Welding Service, Akron, which for some years has specialized in the repair and rebuilding of Banbury mixers, has acquired and is now operating an additional plant at 1171 Wooster Road, Barberton, O., which is devoted to the fabrication of various metal parts and products. The original Akron plant of The Interstate Welding Service will continue to handle Banbury service practically exclusively.

Firestone Tire & Rubber Co., Akron, to help Americans solve the nation's food problem by planting victory gardens, through its Farm Service Bureau is distributing gratis a pocket-size garden guide book, "Helpful Information for Growing a Successful War Garden." Also, as a special service to war gardeners the Bureau will answer, without charge, inquiries concerning specific gardening problems. The company's employes for years have had very successful gardens. Last year $63,700 worth of vegetables were produced.

Firestone has turned over its training facilities in Akron to a group of sailors, who are on a four-week course on the care and repair of the Navy's mobile land equipment. The class is given intensive instruction in the maintenance of tires, tubes, and rims under all conditions. When this first class of 34 seamen completes the program, they will be given certificates of proficiency and will also be qualified to train other men.

Firestone has renewed its contract for the "Voice of Firestone" program over the NBC network, effective May 31, for 52 weeks. The first broadcast was on December 3, 1928.

The Dayton Rubber Mfg. Co., Dayton, recently completed arrangements for $2,500,000 of financing. The Equitable Life Assurance Society of the United States purchased $2,050,000 of 15-year debentures, and the First National Bank of Chicago advanced $450,000 on one- to three-year serial notes. Lehman Bros. acted as agent for Dayton Rubber in arranging the financing; while the Chase National Bank was appointed trustee under the indenture securing the debentures, which carry an interest rate of 4% a year and are due March 1, 1958. A sinking fund of $150,000 annually begins March 1, 1947, and repayment of the new serial notes are scheduled at the rate of $150,000 annually beginning March 1, 1944. Purpose of this new financing was to increase the life of Dayton Rubber's debt structure and raise additional funds to provide for the expanded capital requirements of the business resulting from increased volume. Proceeds of the financing were applied to the payment of $1,250,000 of bank loans due serially to October 15, 1948, and the balance was added to the company's working capital for general corporate purposes. Dayton Rubber is a large manufacturer of V-shaped industrial transmission belts and drives, and the bulk of its output is going to the war effort. Besides its regular products, the company is also supplying the government with special rubber and metal parts for tanks and other combat vehicles.

Goodyear Annual Meeting

Goodyear Tire & Rubber Co., Akron, held its annual stockholders' meeting on March 29 at which the board of directors was reelected as follows: A. G. Cameron, T. M. Girdler, E. B. Greene, H. L. Hyde, P. E. H. Leroy, P. W. Litchfield, G. A. Martin, J. R. Nutt, Robert G. Payne, Robert C. Schaffner, Francis Seiberling, George A. Sloan, C. C. Slusser, C. F. Stone, E. J. Thomas, R. S. Wilson, and R. E. Wood. Later in the day the directorate reelected all company officers, as follows: Mr. Litchfield, chairman and chief executive officer; Mr. Thomas, president; Messrs. Wilson, Leroy, and Slusser, and J. M. Linforth, vice presidents; Z. C. Oseland, treasurer; W. D. Shilts, secretary; C. H. Brook, comptroller; H. W. Hillman, assistant treasurer; Mr. Hyde, general counsel and assistant secretary; W. M. Mettler, assistant secretary; H. D. Hoskin, H. J. Young and H. L. Riddle, assistant comptrollers.

At the earlier meeting Mr. Litchfield announced that the critical stage of the manpower shortage in the company's war plants has been passed, and the problem now becomes one of stabilization and efficiency. He also expects the organization's chief concern this year to center around the supply of materials for aircraft production. The board chairman likewise anticipates that 1943 output and sales will be substantially higher than the peak of '42 if present rates are maintained.

Goodyear's joint labor-management war production drive committee recently adopted a new program, based on proper recognition for departments that maintain a low percentage of absenteeism, in an effort to curtail absences. It includes a plaque presentation plan in each division as an incentive to cut departmental absentee.

Beginning April 20, Goodyear, after a lapse of about ten years, sponsors a series of weekly radio programs, "Salute to Youth", over 110 NBC stations at 7:30 to 8:00 p.m., EWT. Besides the entertainment and news features of the program each week a technician from the Goodyear factories is selected to relate a story of production-line accomplishment. The first such speaker scheduled was James L. Merrill, a chemist recently cited by President Roosevelt for his work with other Goodyear employes in perfecting bullet-puncture-sealing fuel tanks.

F. J. Maxwell, with Goodyear since 1925, has been named manager of plant protection at the company's new synthetic rubber plant at Houston, Tex.

Personnel Director R. S. Pope recently announced the following changes: N. R. Cadot, manager of the labor division, now manager of the efficiency division, replacing E. F. Pierce, assigned to special work; succeeding Mr. Cadot, S. G. Burgess, former manager of personnel efficiency; C. W. Smith, of the employment division, now in the office of the director of personnel; and succeeding Mr. Smith, F. R. Vernotzy, of Plant 2 wage efficiency.

Goodyear engineers have isolated chipped and worn wheel bearings as the cause of premature failure of many truck and trailer tires.

EASTERN AND SOUTHERN

Wartime Packaging Show

Progress in wartime packaging highlighted the fourteenth annual packaging conference and exposition held by the American Management Association, 330 W. 42nd St., New York, N. Y., at the Hotel Astor, New York, April 13-16. Among the speakers at the various sessions was Charles L. Sheldon, purchasing agent for Hood Rubber Co., Watertown, Mass., and a member of the Association's packaging council. The audience fired questions at Mr. Sheldon relating to all problems of present-day packaging, including changes in containers, scarce materials, and government policy toward the industry. Mr. Sheldon told of many acceptable substitutes for rubber, metal, and other pre-war constituents, but he warned of future increased competition for the latter industries as a result. Also, he assured food packagers of adequate supplies of vital materials for food preservation, such as rubber and glass. Papers, too, were presented at the conference, two of which were entitled "Technical Developments in Moisture Proofing and Protection" and "The Packaging of Dehydrated Foods", both by Charles Southwick.

The exposition revealed amazing vitality for a war-torn industry. Among the packaging phenomena were aircraft engines bound securely in Goodyear's Pliofilm; and the Container Corp. of America's seemingly fragile "amphibious" cardboard and fibrous boxes for war materials and rations, endowed with a moisture-, vapor-proof latex base cement perfected by Dewey & Almy Chemical Co., Cambridge, Mass. Rubber was seen only in the military section of the exhibition, where medical and field supplies comprising that substance were self-explanatory of civilian curtailment.

Contributors to the exposition included the Aluminum Co. of America, Pittsburgh, Pa., which featured post-war uses of aluminum; Container Corp. of America, Chicago, Ill., which displayed packaging of war supplies; E. I. du Pont de Nemours & Co., Inc., Cellophane Division, Wilmington, Del., whose booth revealed war uses of cellophane and metal replacement on civilian goods; and Goodyear Tire & Rubber Co., Inc., Akron, O., which showed representative applications of Pliofilm.

Also on the AMA packaging council is L. B. Steele, assistant director of sales at du Pont. On the exhibitors' advisory committee was A. B. Clunan, manager of packaging sales of Goodyear's Pliofilm sales department.

R. D. Wood Co., Philadelphia, Pa., has appointed C. E. Powell manager of its machinery department. Born in New Castle, Pa., Mr. Powell was graduated from Carnegie Institute of Technology in mechanical engineering, in 1919. He has served as a hydraulic engineer with Pittsburgh Crucible Steel Co., sales engineer with Worthington Pump & Machinery Corp., and chief engineer and production

Underwood & Underwood

C. E. Powell

manager of Homestead Valve Mfg. Co. Mr. Powell was also a full-time instructor on the faculty of Carnegie Institute and was associated with Professor W. Trinks in his private consulting practice. Mr. Powell joined the Wood Company in 1936. Besides numerous improvements and patents on machine and control designs, he has contributed many ideas during the present war to high-speed press and control design for the hydraulic forging of nonferrous and aircraft metals, also to valve control for large and fast high-speed ferrous metals hydraulic forging presses.

Wishnick-Tumpeer, Inc., 295 Madison Ave., New York, N. Y., has announced that Clement A. Damen, with Wishnick from 1923 until he went to the Army in September, 1942, has rejoined the company's sales staff, having been honorably discharged from the Medical Corps because of the new age ruling. Mr. Damen will renew his old contacts in New England and will also cover some New York accounts.

Atlas Powder Co., Wilmington, Del., has made M. J. Creighton, for eight years general manager of its cellulose products department, general manager of the industrial chemicals department, including the polyalcohols division and the Darco Corp., and he will also have charge of research and development. J. K. Weidig succeeds Mr. Creighton in the cellulose products department, which includes the Zapon Division, manufacturing industrial finishes, and the Zapon-Keratol Division, making coated fabrics. Mr. Weidig had been president of the Keratol Co. until it was acquired by Atlas in 1941; then he became assistant general manager of the department in charge of coated fabrics. E. H. Bucy, who recently resigned as chief of the protective coatings section, WPB Chemicals Branch, is now assistant general manager of Atlas's cellulose products department. Headquarters are in Stamford, Conn.

Essex Rubber Co., Trenton, N. J., has named Jack Rines to manage its rubber reclaimers plant. He was formerly with the Flintkote Co., New York, N. Y.

Quartermaster Expositions

The new Quartermaster Corps' Branch Procurement Office opened at 521 Fifth Ave., New York, N. Y., on April 22. Every soldier item is displayed there from chewing tobacco to WAAC rubberized raincoats. Other articles on exhibition which claim rubber as a constituent are jungle camouflage suits having rubber-soled, cloth-topped boots; rubber bladders that can pinch-hit for life preservers; rubber-coated canopies for hammocks; rubber-lined suspending water-purifiers; full length rubber waders; various types of natural and reclaimed rubber-soled and heeled Army shoes, sneakers, and overshoes; rubber gaskets; and some tools of partial rubber composition such as blow torches, volt testers, and accessory tubing.

Another exhibit which opened in New York last month was one sponsored by the procurement service of the Army Quartermaster Corps and the Smaller War Plants Corp. It took place in Room 725 of the Chanin Bldg., 122 E. 42nd St., and enjoyed a week's stay there. The purpose of this relatively miniature exposition was to spread war contracts among distressed small plants in the New York-New Jersey area which are equipped to produce items essential to the war effort. The program was launched on a nation-wide scale, and shows similar to the one in New York were opened in each of the other eleven SWPC regions of the country. Featured rubber-containing articles included service shoes, mountain ski boots, rubber hip boots, rubber knee boots, and rubber heels.

Hercules Powder Co., Wilmington, Del., recently held a directors' meeting at which Treasurer Edward B. Morrow was elected vice president; while Francis J. Kennerley, assistant treasurer, was named to the treasurer's post. Mr. Kennerley is succeeded by Leslie W. Mason, comptroller, which post is now held by Wm. S. Harkins, formerly assistant to the comptroller, whose successor is Edward C. Hastings. Other officers were reelected.

Glyco Products Co., Inc., Brooklyn, N. Y., in line with its expansion program on April 15 moved its administrative offices to larger quarters at 26 Court St. The telephone number remains Main 4—1760.

American Viscose Corp, 350 Fifth Ave., New York, N. Y., has appointed Karl M. Currier manager of the war procurement department and Wm. M. Harvey assistant manager. Mr. Currier formerly was assistant manager of the sales development department at Marcus Hook, Pa., and Mr. Harvey a member of the staff of the war procurement department.

Robins Conveying Belt Co., designer, manufacturer, and erector of materials handling machinery, Passaic, N. J., has changed its name to Robins Conveyors, Inc.

Intercontinental Rubber Co., 745 Fifth Ave., New York, N. Y., in its annual report of April 6 to stockholders, stated that no information has been received regarding its Sumatra estate since the Japanese occupation of the island. Operations in Mexico have been fairly satisfactory although much hampered by war restrictions. The Cedros litigation has been settled subject to further contractural arrangements with the Mexican Government toward which satisfactory progress is being made. The supply of wild guayule is fast diminishing, and the company does not feel justified in increasing production much in excess of last year, as it cannot bring the first crop of cultivated shrub to maturity much prior to the time when it will barely replace the lack of wild shrub. The company's Mexican guayule rubber production for the past four years follows, in pounds: 1942, 12,663,800; 1941, 10,121,200; 1940, 8,325,200; 1939, 5,764,400.

The Thermoid Co., Trenton, N. J., reported March sales at $1,160,342, contrasted with $1,087,851 in March, 1942. Sales for the first quarter this year totaled $3,465,432, against $3,123,661 a year ago.

United States Rubber Co., 1230 Sixth Ave., New York, N. Y., last month held its annual stockholders' meeting in Passaic, N. J., when Chairman of the Board F. B. Davis, Jr., announced that the company hopes to place both preferred and common dividend payments on a regular quarterly basis. He also revealed that sales in the first quarter this year were 72% ahead of the corresponding period of 1942 and that current earnings, before tax charges, are better than at this time last year. In the first quarter of 1942 U. S. Rubber had only one government-owned plant for war needs in operation; now it has eight. Stockholders voted to amend the company's retirement allowance plan to provide a larger allowance for retired employes.

C. W. Higbee has been made head of U. S. Rubber's new wire and cable department, according to W. H. Cobb, general manager of the company's mechanical goods division. Mr. Higbee joined U. S. Rubber in 1919 in the wire sales department at Bristol, R. I., where he later became factory superintendent. Eventually he became assistant manager and then manager of wire sales.

Charles L. Glaes, who joined U. S. Rubber's Williamsport, Pa., plant as a clerk 26 years ago, and more recently had been factory manager there and then factory manager of the Mishawaka, Ind., plant, has been made production manager of the company's four footwear plants, now engaged in making many articles essential to the war effort.

Ralph Hanes, with U. S. Rubber 15 years, has been made manager of sales promotion, mechanical goods division, according to H. A. Everlien, manager of branch sales.

United States War Shipping Administration, Washington, D. C., on April 6 published first schedules of ocean freight rates on cargoes between the United States and French North Africa. Rate Order No. 176, which relates to exports, covers such commodities as aluminum, antimony, automobiles and parts therefor, glycerine, radio equipment, rubber soling, shellac, rubber tires, friction and insulating tape, and zinc oxide. Rate Order No. 177, imports, includes beeswax and gum sandarac.

MIDWEST

The Chicago Drug & Chemical Association at its annual meeting March 25 elected the following officers: president, Joseph P. Sullivan, of Grasselli department, E. I. du Pont de Nemours & Co., Inc.; vice president, F. Dean Hildebrandt, Prior Chemical Corp.; treasurer, Edgar E. Brand, L. Sonneborn Sons, Inc.; and secretary, Gerald F. Pauley, Monsanto Chemical Co.

Thirty-two rubber firms in the Midwest recently paid 16,381 workers $748,000 in wages, gains of 2.1% and 2.6% respectively over the previous month, when 33 concerns reported.

National Association of Waste Material Dealers, Inc., 1109 Times Bldg., New York, N. Y., at the Hotel Sherman, Chicago, Ill., March 16-17, held its thirtieth annual convention and wartime conference, which proved to be the largest in its history. David Feinburg, of David Feinburg Co., Medford, Mass., was reelected president of the Association. The thirtieth annual meeting of the Scrap Rubber Institute, a division of the N.A.W.M.D., was marked by the election of officers, as follows: president, Alex Schulman; vice president, A. Lowenstein; secretary-treasurer, Charles Haskins; executive committee, Julius Muehlstein, Nat. E. Zerzen, Irwin Dresser, Mr. Feinburg, E. B. Friedlander, Nat. Lakin, and Samuel L. Bierman. Mr. Muehlstein, former president of the Institute, is also a director and third vice president of the N.A.W.M.D.

CANADA

Rubber Control; Scrap Prices

Rubber Controller Alan H. Williamson on March 26 consolidated into a single new rubber control order all orders affecting the processing of natural, synthetic, and reclaimed rubber. It lists those articles for which no rubber has been released since early 1942 and also rubber items which may yet be made in accordance with rubber control specifications and those which may be made only from reclaim. No passenger tires are manufactured except a limited few of reclaim. Usable tires, tubes, and retreading services are rationed, with 120 rationing representatives throughout the Dominion. Under rigid specifications, only the most essential civilian rubber goods, as truck and bus tires, surgeons' gloves, belting, and industrial hose, may be produced. Among the restricted reclaim items for essential civilian consumption is a small amount of staple black lines of waterproof footwear.

Also reported is the release of an order permitting manufacturers to make 50% of the tennis balls produced in 1941 for 1943 delivery. All, however, will be of reclaim.

The Canadian Government has set prices to be paid by dealers for scrap rubber, as follows: mixed tires, $10 a ton; mixed boots and shoes, $15 a ton; mixed rubber, $7 a ton; mixed inner tubes, 5¢ a pound. Fairmont Co., Ltd., government agency purchasing scrap rubber, is paying per carload or truckload, minimum 2,000 pounds, the following prices, mixed tires, $13 a ton; mixed boots and shoes, $18 a ton; mixed rubber, $10 a ton; and mixed inner tubes, 6¢ a pound. Freight rates are absorbed by the Fairmont company.

Synthetic rubbers of the Buna S and Butyl types are exempt from the war exchange tax of 10% when imported from countries the products of which are subject to intermediate or general tariff treatment. The Order extends fom January 2, 1943, to December 31, 1943.

The Northern Ontario Tourist Association in an appeal to its 700 members for scrap this winter collected more than 250,000 pounds of scrap rubber and much scrap metal. Much of the material came from the members' docks, boathouses, sheds, and summer camps.

Dominion Rubber Co., Ltd., Montreal, P. Q., according to Production Manager H. Wolfhard, has appointed F. G. Meunier manager of the Merchants Rubber Factory, Kitchener, Ont., one of the company's footwear manufacturing units. Mr Meunier, formerly assistant factory manager of the plant, started in the rubber industry in 1917 as laboratory assistant at Dominion's Papineau Factory, Montreal, and from 1925 until he went to the Merchants plant in 1929 was millroom foreman at the Maple Leaf Rubber Factory, Port Dalhousie, Ont. H. A. Kraatz, at Merchants since 1900 and lately factory superintendent, is now assistant factory manager there.

The Association of Canadian Storage Battery Manufacturers recently was formed in Toronto, Ont., by manufacturers representing more than 90% of the Dominion's battery production. The following officers were elected: president, J. E. Eells, Exide Batteries of Canada, Ltd.; secretary-treasurer, J. S. Cohen, Monarch Battery Mfg. Co., Ltd.; other directors, W. W. Taylor, Prest-O-Lite Storage Battery Co., Ltd., H. G. Mills, Willard Storage Battery Co. of Canada, Ltd., C. H. Hargreaves, Hart Battery Co., Ltd., and R. Ramge, Globe-Lite Batteries, Ltd.

The Industrial Accident Prevention Associations held the 1943 safety convention and exhibition at the Royal York Hotel, Toronto, Ont., April 12 and 13.

Among the participating divisions was the Leather, Rubber & Tanners' Safety Association. One of the opening addresses was made by E. O. Morgan, of Canadian National Carbon Co., Ltd., Toronto, who was vice chairman of the committee on safety convention and chairman of the program committee, and is a vice president of IAPA. Exhibitors included: Butler Industrial Supply Co., Ltd., Toronto, safety goggles and masks; Fitwell Glove & Mfg. Co., Windsor; J. F. Hartz Co., Ltd., Toronto, physicians' and hospital supplies; Ingram & Bell, Ltd., first-aid and hospital supplies; Guelph Elastic Hosiery Co., Ltd., Guelph, Ont.; F. S. Micklethwaite, Toronto, "Protex" body supports for workers; Mine Safety Appliances Co. of Canada, Ltd., Toronto; and Safety Supply Co., Toronto, industrial safety equipment.

Kok-Saghyz in Canada

The Department of Agriculture, Ottawa, Ont., reports enough seed may be obtained this year for commercial production of the Russian dandelion, *kok-saghyz*. From plantings in Canada in 1942, plus supplies from Russia and the United States, 36 acres can be planted this spring at experimental farms and stations. If the yield is good, commercial plantings will be possible. Intensive experiments are being made on rubber production from the plant by the Division of Botany Science Service in cooperation with the experimental Farms Service. The National Research Council has undertaken similar work.

As *kok-saghyz* is a newcomer to Canadian agriculture, its biological characteristics and cultural peculiarities must be learned. Besides seed gathering and root harvesting methods must be tried, genetic studies made, and breeding methods and physiological problems investigated. The winter hardiness of the plant in different parts of the Dominion also has yet to be determined. So far, however, officials state, the limited extent of the cooperative research work has been encouraging.

Some *kok-saghyz* seed from the U. S. Department of Agriculture last spring was planted in quarter-acre plots at Dominion experimental stations across Canada to produce seed and roots, as it is the latter that gives the rubber. But the rubber content varied from 2% to 7%. The yield of roots per acre ranged from 8,100 pounds at Kentville, N. S., to 1,600 pounds at Winnipeg, Man. If the crop is left for a second year, the average yield is from 2,700 to 3,600 pounds, and from 100 to 150 seeds per acre.

Rubber from milkweed is also being studied, and ten acres are to be sown this year at the Central Experimental Farm at Ottawa. The leaves and stalks contain a percentage of crude rubber, and the floss from the seed pods can be used for the same purposes as kapok.

American Hard Rubber Co., New York, N. Y. For 1942: net income, $330,549, or $2.18 a common share, against $495,087, or $4.04 a share, the year before.

FINANCIAL

American Cyanamid Co., New York, N. Y., and subsidiaries. For 1942: net income, $5,666,901, or $1.95 a common share, against $6,347,398, or $2.42 a share, in 1941; (however including equity in undistributed net income of Southern Alkali Corp. and other affiliated companies net income a common share in the respective years was $2.05 and $2.56); income and excess profits taxes, $15,100,000, against $11,457,636.

American Wringer Co., Inc., Woonsocket, R. I. For 1942: net income, $105,387, equal to 95¢ each on 110,835 common shares, against $380,512, or $3.43 a share, in 1941.

Belden Mfg. Co., Chicago, Ill. For 1942: net earnings after taxes, $459,247, or $1.90 a share, against $641,400, or $2.66 a share, in 1941; net sales, $10,271,000, against $10,044,000.

Canada Wire & Cable Co., Ltd., Montreal, P. Q., Canada. For 1942: net profit, $1,091,181, equal, after preferred and Class A stock dividends, to $5.20 each on 150,664 shares of Class B stock, compared with a net (adjusted) of $1,204,862, or $5.97 a share, the year before; taxes, $2,285,402 (including a refundable portion of $220,803), against $2,008,413; inventories, $3,144,937, against $3,287,352; current assets, including cash and marketable securities of $1,894,187, $7,094,644, current liabilities, $2,420,494, contrasted with respective figures of $1,518,192, $6,860,179, and $2,422,334 on December 31, 1941.

Philip Carey Mfg. Co., Lockland, Cincinnati, O. For 1942: net profit, $717,331, equal, after preferred dividends, to $1.58 each on 390,180 common shares, against $1,364,848, or $3.29 a share, in 1941; net sales, $26,043,707, against $25,273,189.

Converse Rubber Co., Malden, Mass. Year ended January 31, 1943: net profit, after $584,000 taxes and $70,000 contingencies, $167,173, against $151,585 in the preceding 12 months.

Corduroy Rubber Co., Grand Rapids, Mich. For 1942: net income, $95,499, equal to 63¢ each on 28,108 common shares, against $219,341, or $3.53 each on 28,110 shares, in 1941.

Crown Cork & Seal Co., Baltimore, Md., and wholly owned domestic subsidiaries. For 1942: net profit, $1,458,564, equal to $1.84 a common share, against $2,929,861, or $4.68 a share, the year before; federal income taxes, $950,867, against $1,517,498; excess profits tax, $1,792,350, after $199,150 debt retirement credit, against $57,902.

General Cable Corp., New York, N. Y. For 1942: net profit, $2,786,171, against $3,937,921 in 1941; federal income and excess profits taxes, $11,500,000, against $8,760,000.

Detroit Gasket Mfg. Co., Detroit, Mich. For 1942: net profit, $412,707, equal to $1.71 a common share, against $418,029, or $2.01 a share, in 1941.

Dunlop Tire & Rubber Goods Co., Ltd., Toronto, Ont., Canada. For 1942: net profit, $169,235, against $184,415 in 1941; surplus, $605,513, against $432,497; taxes, $650,000; reserve for war contingencies, $130,000.

Dewey & Almy Chemical Co., Cambridge, Mass. For 1942: consolidated net profit, after $428,000 federal, state and foreign taxes, $533,203, equal to $1.81 each on 295,317 common shares, against $757,845, or $2.57 a share, in 1941.

General Motors Corp., Detroit, Mich., and subsidiaries. For 1942: consolidated net income: $163,651,587, equal, after preferred dividends, to $3.55 each on 43,498,457 common shares, compared with $201,652,508, or $4.44 a common share, in 1941; net sales, $2,250,548,859, against $2,436,800,977.

I. B. Kleinert Rubber Co., New York, N. Y., and subsidiaries. For 1942: net profit, $315,817, equal to $1.94 a share, against $411,043, or $2.52 a share, in 1941.

Intercontinental Rubber Co., New York, N. Y., and subsidiaries. For 1942: net income, $565,781, equal to 95¢ a share, against $370,233, or 62¢ a share, in 1941; current assets, including $2,022,871.55 cash, December 31, 1942, $2,941,458.61, current liabilities, $282,301.07, compared with the respective figures of $1,217,457.46, $1,569,429.99, and $461,372.46 a year previous.

Lima Cord Sole & Heel Corp., Lima, O. For 1942: net income, $86,917, equal to 79¢ each on 110,659 common shares, against $130,065, or $1.16 each on 111,689 common shares the year before.

Mansfield Tire & Rubber Co., Mansfield, O. For 1942: net income, $507,257, equal to $3.02 each on 157,400 common shares, against $484,475, or $2.88 a share, the year before.

Minnesota Mining & Mfg. Co., St. Paul, Minn. For 1942: net profit, $3,430,450, equal to $3.57 a common share, against $4,534,097, or $4.72 a share in 1941; provision for taxes, $6,521,000, against $5,550,000; reserve for special contingencies, $500,000, against $300,000; current assets, December 31, 1942, $20,337,687; current liabilities, $9,119,169.

Skelly Oil Co., Kansas City, Mo. For 1942: consolidated net income, $5,632,805, equal to $5.73 each on 981,349 capital common shares outstanding, against $5,913,826, or $6.02 a share, in 1941; current assets, December 31, 1942, $20,369,925, current liabilities, $8,506,559, against $16,343,358 and $7,898,307, respectively, the year before.

Timken Roller Bearing Co., Canton, O., and subsidiary. For 1942: net profit, $6,475,262, equal to $2.68 a share, against $9,476,839, or $3.92 a share, in 1941.

(Continued on page 200)

Rubber Reserve Co. Circulars

No. 17 on Distribution of Rubber

1. This Circular supersedes all previous Circulars issued by Rubber Reserve Co. relating to the sale of crude rubber, balata, guayule, synthetic rubber, and liquid latex.

2. Effective April 1, 1943, crude rubber, balata, guayule, synthetic rubber, and liquid latex will be sold for civilian use and for other than civilian use at the prices listed in the respective columns on the attached schedule designated Exhibit "A", which has been approved by the Office of Price Administration and the Office of the Rubber Director. The uniform freight charges hereinafter referred to will be added to such prices. In accordance with the provisions of the telegram of March 8, 1943, from L. D. Tompkins, Assistant Deputy Rubber Director in Charge of Operations, manufacturers will, however, be permitted to purchase, at the prices which were in existence prior to April 1, 1943, an amount of rubber sufficient to build up a 60-day working inventory as of March 31, 1943, for consumption for all permitted purposes, provided requests therefor are received by the Office of the Rubber Director prior to April 1, 1943. Upon receipt of the approval of the request from the Office of the Rubber Director, Rubber Reserve Co. will issue the necessary purchase permit, although in most instances the actual delivery of the material will not be effected until after April 1, 1943. Subject to the aforesaid 60-day inventory limitation, rubber covered by outstanding purchase permits which specify delivery prior to the month of April will be sold at the prices in existence prior to April 1, 1943, provided such purchase permits are presented to the Distributing Agent of Rubber Reserve Co. within 30 days from the date of the issuance thereof.

3. In view of the uncertainty of the location of warehouses and producing plants from which crude rubber, balata, guayule, synthetic rubber, and liquid latex will be delivered, and in order to establish a uniform freight charge to all manufacturers, a charge of 50¢ per 100 pounds net weight on the material shipped in carload lots (at the minimum quantity weight for the applicable freight rate) and $1 per 100 pounds net weight on the material shipped in less than carload lots will be added by Rubber Reserve Co. to the selling prices appearing on Exhibit "A." In connection with liquid latex, freight charges will be based on the total dry latex solids weight. The certified check or banker's New York draft which is delivered to the Agent of Rubber Reserve Co. by the manufacturer, or its dealer agent, in payment of the material should include the amount of the uniform freight charge referred to above. Freight will be paid by Rubber Reserve Co. to the purchaser's railroad siding at first destination or point of railroad delivery at first destination in continental United States. The purchaser should route the material purchased in such manner as to protect storage in transit privileges, and the applicable through rate from first point of origin or port of entry to designated destination, if storage in transit arrangements have previously been made by Rubber Reserve.

In the event the purchaser elects to use a method of transportation other than rail, Rubber Reserve Co. will pay the established charges for the actual method of transportation used to the extent they do not exceed the amount Rubber Reserve Co. would have paid had the purchaser made shipment by rail.

A straight rail bill of lading should be prepared by the purchaser or its dealer agent in the name of Rubber Reserve Co. as shipper, and endorsed "To Be Prepaid" in the column provided for on the bill of lading.

The original or memorandum signed bill of lading and prepaid freight bill, in triplicate, should be forwarded by the purchaser or its dealer agent to the Agent of Rubber Reserve Co. which released the material for shipment in order that payment may be made to the carrier.

After title passes in accordance with the provisions of paragraphs 11, 12, 18, 23, 25, 30, and 36 hereof, Rubber Reserve Co. accepts no responsibility for any loss whatsoever, including, without limitation, shortages, deterioration, damage, insurance coverage or failure of the purchaser or its dealer agent to comply with the provisions of this Circular.

4. Deliveries of crude rubber, balata, guayule, synthetic rubber, and liquid latex will be made in the manner hereinafter provided. In order that there may be the least possible dislocation in the usual channels of distribution, it is assumed that most manufacturers will prefer to have dealers act as their agents in purchasing crude rubber, balata, guayule and synthetic rubber from Rubber Reserve Co., and in connection therewith render certain services as has been the custom in the past. This procedure, however, is optional, and should they so desire, manufacturers may arrange for their own deliveries.

The Rubber Trade Association of New York, Inc., has prepared the following schedules of fixed charges (exclusive of charges for weighing which will be absorbed by Rubber Reserve Co.) to be made by dealers when acting as agents for manufacturers:

Long Tons	Schedule No. 1 Plantation, Synthetic, Guayule, and Wild Rubbers ¢ per Pound	Schedule No. 2 Balata ¢ per Pound
750 tons and over	⅛	⅛
100 tons up to 750 tons	¼	¼
30 tons up to 100 tons	⅜	½
10 tons up to 30 tons	¾	1¼
1 ton up to 10 tons	1	2
Less than 1 ton	2½	4

The charges contained in Schedule No. 1 (which are for the account of the manufacturer and not Rubber Reserve Co.) shall apply to the entire weight of all grades of crude rubber, guayule, and synthetic rubber which any manufacturer may be authorized to consume during a single month, irrespective of the number of individual deliveries made or the number of dealers involved. Similarly, the charges contained in Schedule No. 2 shall apply to all grades of balata.

These charges are predicated on maximum terms of payment of 30 days, beginning on the day the dealer pays Rubber Reserve Co. for the crude rubber, balata, guayule, or synthetic rubber.

The Rubber Trade Association of New York, Inc., has advised that it will set up an organization to consolidate, whenever possible, less than carload lots, and this service should result in considerable saving to purchasers of small parcels, and should ease transportation facilities and expedite arrival of the rubber at consumers' plants.

5. All requests by manufacturers for the issuance of permits authorizing the purchase of crude rubber, balata, guayule, and liquid latex should be addressed to the Office of the Rubber Director, War Production Board, New Municipal Building, Washington, D. C., and should be mailed in sufficient time to reach such office prior to the fifteenth day of the month preceding the month during which delivery is desired. There is attached hereto a sample form, designated Exhibit "B", which is to be used for this purpose. Attention is called to the fact that a separate space is provided on the form for the filing of requests for crude rubber, liquid latex, and balata to be used in the manufacture of permitted civilian items. This form should be executed in quadruplicate. (It will be necessary for the manufacturer to draft its own forms, since a supply thereof is not available for distribution.) In cases where a manufacturer requests purchase permits for the purchase of liquid latex, the detailed information appearing on the attached form, designated Exhibit "C", should be supplied in connection with each lot requested.

6. All requests for allocations of synthetic rubber should be addressed to the Synthetic Rubber Allocation Section, Office of the Rubber Director, War Production Board, New Municipal Building, Washington, D. C., as has been the custom heretofore.

Crude Rubber

7. Upon receipt of advice from the Office of the Rubber Director of the action taken in connection with a manufacturer's request for the purchase of crude rubber, purchase permits will be issued by Rubber Reserve Co., in triplicate, and mailed to the manufacturer. Although no change is being made in the form of purchase permit currently in use, separate purchase permits will be issued in connection with rubber to be consumed in the manufacture of permitted civilian items. While the purchase permit specifies that payment is to be made by certified check, banker's New York drafts are acceptable. It is possible that in some cases the request will not be approved as submitted, and in these instances, the amount of crude rubber specified in the purchase permit will represent the action of the Rubber Director. Owing to the necessity of balancing and conserving the stockpile and the uncertainty as to the types and grades which will be available, purchase permits will reflect only the total amount of rubber authorized by the Office of the Rubber Director, and the selling price will not be specified thereon. Either the word "CIVILIAN" or "NON-CIVILIAN" will be typed on all purchase permits issued on and after April 1, 1943, to designate the price which is applicable. In order to facilitate distribution, purchase permits will be issued, in so far as is practicable, in quantities of 100 tons. All purchase permits must be delivered to the Distributing Agent of Rubber Reserve Co. within 30 days from the date of the issuance thereof or returned to the Sales Department, Rubber Reserve Co., 811 Vermont Ave., N. W., Washington, D. C., for cancellation.

8. Full consideration will be given to each manufacturer's request for specific types and grades of rubber, but no assurance can be given that the type and grades requested will be available for delivery.

9. Rubber Reserve Co. will sell rubber to manufacturers ex dock or ex warehouse, at the option of Rubber Reserve Co., at the prices listed on the attached schedule, designated Exhibit "A", plus the uniform freight charge.

10. All sales of crude rubber will be handled by D. D. Haldane, Distributing Agent, Rubber Reserve Co., 15 William St., New York, N. Y. Purchase permits must be executed in triplicate and delivered to the Distributing Agent at the time the rubber is received. The triplicate copy, which will represent an invoice, will be returned to the manufacturer for its files.

11. Crude rubber will be sold on a 10% examination and net test weight basis or on 100% gross weighing and 10% or 100% taring basis, depending upon the grade, at the option of the Distributing Agent, and payment therefor will be required at the time of delivery, by certified check or banker's New York draft, payable to Rubber Reserve Co. It will, therefore, be necessary for manufacturers or their dealer agents to weigh and inspect at point of delivery, thus eliminating the necessity for any adjustments after delivery. Rubber Reserve Co. will absorb the cost of the weighing in all cases, but if delivery is made ex warehouse, the charge for reweighing shall not exceed 65¢ per package net tested on all Plantation Rubber tendered where resident approved weighers have established offices, or 80¢ per package net tested on all Plantation Rubber tendered where no approved weighers have established offices with the exception of all rubber tendered in the State of California where Rubber Reserve Co., for the present, pursuant to the existing laws of such state, is paying $1.25 per package tested. Weighing of grades other than Plantation Rubber will be paid for at current rates subject to the approval of the Distributing Agent.

Weighing charges other than those specified above will be paid for at current rates subject to the approval of the Distributing Agent. Title to the rubber passes upon the exchange of the Distributing Agent's delivery order or warehouse receipt for the manufacturer's (or dealer agent's) certified check or banker's New York draft, and thereafter all risks are for the account of the manufacturer.

12. In cases where rubber is tendered on a proforma basis, pending the definite outturn of weights or quality, title passes upon the exchange of the Distributing Agent's delivery order or warehouse receipt for the manufacturer's (or dealer agent's) certified check or banker's New York draft, and thereafter all risks are for the account of the manufacturer.

13. In cases where the services of a dealer are utilized, the RUBBER MANUFACTURER'S ENDORSEMENT on the reverse side of the purchase permit must be executed by the manufacturer, and the purchase permit, in triplicate, forwarded to the respective dealer. The dealer will then present the purchase permit to the Distributing Agent, who will arrange for the delivery of the rubber described therein. Upon receipt and acceptance of the rubber, the dealer will execute the ACCEPTANCE in triplicate and surrender the purchase permit to the Distributing Agent, accompanied by a certified check or banker's New York draft covering the purchase price of the rubber plus the uniform freight charge. The Distributing Agent will then sign the purchase permit in triplicate, in the space provided therefor, and deliver the triplicate copy thereof to the dealer for transmittal to the manufacturer.

14. Dealers who act as agents for manufacturers and reweigh rubber at warehouses should, at the end of each month, render to the Distributing Agent an invoice covering charges for such services on the basis outlined in paragraph 11. The Distributing Agent will check the invoice against the deliveries and, if found to be correct, indicate his approval thereon and forward the invoice to Rubber Reserve Co. for payment.

Balata

15. Upon receipt of advice from the Office of the Rubber Director of the action taken in connection with a manufacturer's request for the purchase of balata, purchase permits will be issued by Rubber Reserve Co., in triplicate, and mailed to the manufacturer. (No change is being made in the form of purchase permit currently in use.) It is possible that in some cases the request will not be approved as submitted, and in these instances, the amount of balata specified in the purchase permit will represent the action of the Rubber Director.

16. Rubber Reserve Co. will sell balata to manufacturers ex dock or ex warehouse at the option of Rubber Reserve Co. at the prices listed on the attached schedule, designated Exhibit "A", plus the uniform freight charge.

17. All sales of balata will be handled by D. D. Haldane, Distributing Agent, Rubber Reserve Co., 15 William St., New York, N. Y. Purchase permits must be executed in triplicate and delivered to the Distributing Agent at the time the balata is received. The triplicate copy, which will represent an invoice, will be returned to the manufacturer for its files.

18. Balata will be sold on a 10% examination and net test weight basis or on 100% gross weighing and 10% or 100% taring basis, depending upon the grade and at the option of the Distributing Agent, and payment therefor will be required at the time of delivery, by certified check or banker's New York draft, payable to Rubber Reserve Co. It will, therefore, be necessary for manufacturers or their dealer agents to weigh and inspect at point of delivery, thus eliminating the necessity for any adjustments after delivery. Rubber Reserve Co. will absorb the cost of the weighing in all cases, but if delivery is made ex warehouse, the charge for reweighing shall be at current rates subject to the approval of Distributing Agent. Title to the balata passes upon the exchange of the Distributing Agent's delivery order or warehouse receipt for the manufacturer's (or dealer agent's) certified check or banker's New York draft, and thereafter all risks are for the account of the manufacturer.

19. If the services of dealer agents are utilized, the procedure outlined above in paragraphs 13 and 14 under "Crude Rubber" will be followed.

Guayule

20. Upon receipt of advice from the Office of the Rubber Director of the action taken in connection with a manufacturer's request for the purchase of guayule, purchase permits will be issued by Rubber Reserve Co. in triplicate, and mailed to the manufacturer. (No change is being made in the form of purchase permit currently in use.) It is possible that in some cases the request will not be approved as submitted, and in these instances, the amount of guayule specified in the purchase permit will represent the action of the Rubber Director.

21. Rubber Reserve Co. will sell guayule to manufacturers ex dock or ex warehouse or delivered manufacturer's plant, at the option of Rubber Reserve Co., at the prices listed on the attached schedule, designated Exhibit "A", plus the uniform freight charge.

22. All sales of guayule *in less than carload lots* will be handled by D. D. Haldane, Distributing Agent, Rubber Reserve Co., 15 William St., New York, N. Y. Purchase permits must be executed in triplicate and delivered to the Distributing Agent at the time the guayule is received. The triplicate copy, which will represent an invoice, will be returned to the manufacturer for its files.

23. Guayule will be sold in less than carload lots on a 10% examination and net test weight basis and payment therefor will be required at the time of delivery by certified check or banker's New York draft, payable to Rubber Reserve Co. It will, therefore, be necessary for manufacturers or their dealer agents to weigh and inspect at point of delivery, thus eliminating the necessity for any adjustments after delivery. Rubber Reserve Co. will absorb the cost of the weighing in all cases, but if delivery is made ex warehouse, the charge for reweighing shall be at current rates subject to the approval of Distributing Agent. Title to the guayule passes upon the exchange of the Distributing Agent's delivery order or warehouse receipt for the manufacturer's (or dealer agent's) certified check or banker's New York draft, and thereafter all risks are for the account of the manufacturer.

24. If the services of dealer agents are utilized, the procedure outlined above in paragraphs 13 and 14 under "Crude Rubber" will be followed.

25. Sales of guayule to manufacturers in carload lots will be handled through the Sales Department of Rubber Reserve Co., 811 Vermont Ave., N. W., Washington, D. C., rather than through the office of the Distributing Agent. Purchase permits will be issued in triplicate and forwarded to the manufacturer. Guayule, in carload lots, will in most instances be shipped direct to the manufacturer from the point at which the material is imported into the United States. As has been the custom heretofore, manufacturers will be invoiced by the Treasurer for guayule which is shipped in this manner. Invoices are payable immediately upon the receipt thereof, and remittance in the form of a certified check or banker's New York draft should be mailed to W. C. Beck, Jr., Treasurer, Rubber Reserve Co., 811 Vermont Ave., N. W., Washington, D. C., accompanied by a copy of the invoice and the original and one copy of the purchase permit, with the MANUFACTURER'S ACCEPTANCE executed on the reverse side in the space provided therefor. The triplicate copy of the permit should be retained by the manufacturer for its files. Title to the guayule passes to the manufacturer upon the delivery of the material F.O.B. cars at the manufacturer's plant, and thereafter all risks are for the account of the manufacturer.

Synthetic Rubber

26. The procedure under which synthetic rubber is sold to manufacturers at the present time will be discontinued, and effective April 1, 1943, purchase permits will be issued in lieu of Synthetic Rubber Shipping Authorizations. A sample copy of the

RUR-5-7
(Rev. 3-13-43)

RUBBER RESERVE COMPANY
811 Vermont Avenue
WASHINGTON, D. C.

No. SR _____

Date _____

SYNTHETIC RUBBER PURCHASE PERMIT

_____
(Company Name)

whose principal office is located at _____
(Address)

is authorized to purchase synthetic rubber of the type, in the quantity, and at the price per pound listed below, F. O. B. producing plant, or ex warehouse, at the option of Rubber Reserve Company, for shipment during the month of _____, 194__.

Pounds	Type	Price Per Pound

The synthetic rubber described above will be supplied by _____

_____, Agent for Rubber Reserve Company, located at

_____

When purchase is made direct from Rubber Reserve Company, the permit, accompanied by shipping instructions and bankers New York draft or certified check, payable to Rubber Reserve Company, shall be delivered by the purchaser to the agent specified above.

When the order is placed through a dealer, the PURCHASER'S ENDORSEMENT, authorizing the dealer to act as agent, shall be executed by the purchaser, and the permit, accompanied by shipping instructions and bankers New York draft or certified check, payable to Rubber Reserve Company, shall be delivered by the dealer to the agent of Rubber Reserve Company specified above.

RUBBER RESERVE COMPANY

_____
(Authorized Signature)

THIS PERMIT IS NON-NEGOTIABLE AND NON-TRANSFERABLE AND IS AUTOMATICALLY CANCELED IN THE EVENT IT IS NOT PRESENTED TO THE SPECIFIED AGENT OF RUBBER RESERVE COMPANY PRIOR TO THE END OF THE AUTHORIZED MONTH OF SHIPMENT.

PURCHASER'S ENDORSEMENT

We hereby constitute and appoint _____
nesler in crude rubber, located at _____
as our official agent to purchase the synthetic rubber described in this permit, for shipment during the month of _____, 194__.

_____ Company

_____ Official Signature

_____ Title

DETAIL OF SHIPMENT

Date	Pounds	Type	Price Per Pound	Amount	Carrier

Bankers New York draft or certified check in the amount of $ _____ has been received from _____ in payment of the material listed above.

_____
As Agent for Rubber Reserve Company

_____
(Official Title)

Front *(Left)* and Back *(Above)* of Synthetic Rubber Purchase Permit

purchase permit is attached hereto for informative purposes.

27. Upon receipt of an allocation from the War Production Board, Rubber Reserve Co. will issue a purchase permit, in triplicate, and forward the purchase permit to the purchaser. The name and address of the Agent of Rubber Reserve Co. which will supply the material will appear on the purchase permit.

28. If the amount of synthetic rubber allocated by the War Production Board is not in excess of a carload (approximately 60,000 pounds) the purchaser will be required to take delivery of the material in one lot. In cases where the amount allocated is in excess of a carload and the purchaser desires to secure delivery in more than one lot, the Sales Department of Rubber Reserve Co. should be advised by telegraph to this effect immediately upon receipt of advice by the purchaser from the War Production Board of the amount allocated, and a separate purchase permit will then be issued to cover each delivery which is requested.

29. Rubber Reserve Co. will sell synthetic rubber to purchasers F.O.B. the producing plant or ex warehouse, at the option of Rubber Reserve Co., at the prices listed on the attached schedule, designated Exhibit "A", plus the uniform freight charge.

30. All sales of synthetic rubber will be handled by the Agent of Rubber Reserve Co. designated in the purchase permit. Purchase permits must be executed in triplicate and delivered to the Agent, accompanied by appropriate shipping instructions, and a certified check or banker's New York draft, payable to Rubber Reserve Co. The triplicate copy of the purchase permit, which will represent an invoice, will be returned to the purchaser for its files. Title to the synthetic rubber passes when the material is delivered to the carrier at the producing plant, and thereafter all risks are for the account of the purchaser.

In cases of sales ex warehouse, title passes upon the exchange of the Agent's delivery order or warehouse receipt for the purchaser's (or dealer agent's) certified check or banker's New York draft, and thereafter all risks are for the account of the purchaser.

31. In cases where the services of a dealer are utilized, the PURCHASER'S ENDORSEMENT on the reverse side of the purchase permit must be executed by the purchaser, and the purchase permit, in triplicate, forwarded to the respective dealer. The dealer will then deliver the purchase permit to the designated Agent, accompanied by shipping instructions and a certified check or banker's New York draft. Upon shipment of the material, the Agent will sign the purchase permit, in triplicate, in the space provided therefor and deliver the triplicate copy thereof to the dealer for transmittal to the purchaser.

32. All synthetic rubber manufactured in government owned plants is produced to standard specifications and packed in uniform size containers, and, therefore, no occasion for quality or weight adjustments should arise.

Liquid Latex

33. Upon receipt of advice from the Office of the Rubber Director of the action taken in connection with a manufacturer's request for the purchase of liquid latex, purchase permits will be issued by Rubber Reserve Co. in triplicate and mailed to the manufacturer. (No change is being made in the form of purchase permit currently in use.) It is possible that in some cases requests will not be approved as submitted, and in these instances, the amount of liquid latex specified in the purchase permit will represent the action of the Rubber Director.

34. In view of the need to make certain that stocks of liquid latex which are substandard or off quality, or which are in any danger of materially losing quality, are consumed before stocks which are better able to be stored for a long period, Rubber Reserve Co. will issue purchase permits for such material first. Although every effort will be made to supply manufacturers with the grade and quality of liquid latex they request, the prior consumption of substandard or off-quality stocks is of national importance and must be given first consideration. Manufacturers will, however, be furnished, in the discretion of Rubber Reserve Co., the nearest type of liquid latex which is practicable.

35. Rubber Reserve Co. will sell liquid latex to manufacturers ex point of shipment, to be determined by Rubber Reserve Co., at the prices listed on the attached schedule, designated Exhibit "A", plus the uniform freight charge.

36. Liquid latex will be sold to manufacturers by the following authorized Agents of Rubber Reserve Co.:

American Anode, Inc., Akron, O.
Dunlop Tire & Rubber Corp., River Road and Sheridan Drive, Buffalo, N. Y.
Firestone Tire & Rubber Co., Akron, O.
General Latex & Chemical Co., 666 Main St., Cambridge, Mass.
Goodyear Tire & Rubber Co., Akron, O.
Heveatex Corp., 78 Goodyear Ave., Melrose, Mass.
Naugatuck Chemical Division of United States Rubber Co., 1230 Sixth Ave., New York, N. Y.

Revertex Corp. of America, 37-08 Northern Blvd., Long Island City, N. Y.
Charles T. Wilson Co., Inc., 120 Wall St., New York, N. Y.

Purchase permits must be presented to the Agent indicated thereon within 30 days from the date thereof, and delivery of the material covered thereby must be taken within the period specified on the purchase permit. All purchases of liquid latex shall be paid for in advance by delivering a certified check or banker's New York draft, payable to Rubber Reserve Co., to the Agent designated in the purchase permit. Title to the material passes to the manufacturer upon delivery of the certified check or banker's New York draft to the Agent of Rubber Reserve Co., and thereafter all risks are for the account of the manufacturer. All purchase permits not completed by delivery within 60 days from the date of issuance will be automatically cancelled. Delivery must be taken in one lot unless otherwise requested. Separate purchase permits will be issued in cases where more than one delivery is involved.

37. Reusable drums owned by Rubber Reserve Co. will be stencilled to indicate the governmental ownership thereof and, when empty, should be returned to the Agent who shipped the material, or to the destination designated by such Agent, at Rubber Reserve Co.'s expense.

38. Manufacturers who purchase liquid latex from Rubber Reserve Co. are expected to take every possible precaution to keep the latex in good condition, especially during winter months.

March 23, 1943.

RUBBER RESERVE COMPANY SELLING PRICES

(in cents per pound)

EXHIBIT "A"

CRUDE RUBBER

Plantation Rubber

(in cases and/or bales, at Rubber Reserve Co.'s option)

Delivery ex dock or ex warehouse at Rubber Reserve Co.'s option plus a uniform freight charge of one half cent (½¢) per pound based on net delivered weight for carload quantities (at the minimum weight provided for by the applicable freight rate) or one cent (1¢) per pound for less than carload quantities based on net delivered weights.

Grade	Civilian Use	Other Than Civilian Use
#1X Ribbed Smoked Sheets	22½	40
1 Ribbed Smoked Sheets	22½	40
2 Ribbed Smoked Sheets	22¼	39¾
3 Ribbed Smoked Sheets	22	39½
4 Ribbed Smoked Sheets	21¾	39¼
5 Ribbed Smoked Sheets	20⅝	38⅛
#1X Thick Pale Latex Crepe	22½	40
1 Thick Pale Latex Crepe	22½	40
2 Thick Pale Latex Crepe	22	39½
3 Thick Pale Latex Crepe	21¾	39¼
#1X Thin Pale Latex Crepe	22½	40
1 Thin Pale Latex Crepe	22½	40
2 Thin Pale Latex Crepe	22	39½
3 Thin Pale Latex Crepe	21¾	39¼
#1X Thick Brown Crepe	21⅜	38⅞
2X Thick Brown Crepe	21⅛	38⅝
3X Thick Brown Crepe	20	37½
#1X Thin Brown Crepe	21⅜	38⅞
2X Thin Brown Crepe	21⅛	38⅝
3X Thin Brown Crepe	20	37½
#1 Thick Remilled Blankets	21⅜	38⅞
2 Thick Remilled Blankets	21¼	38¾
3 Thick Remilled Blankets	21⅛	38⅝
4 Thick Remilled Blankets	20⅝	38⅛
#1 Thin Brown Remilled Crepes	21¼	38¾
2 Thin Brown Remilled Crepes	21	38½
3 Thin Brown Remilled Crepes	20⅝	38⅛
4 Thin Brown Remilled Crepes	20	37½
Rolled Brown or Flat Bark	18	35½
#1 Smoked Blankets	21⅜	38⅝
2 Smoked Blankets	21	38½
3 Smoked Blankets	20¾	38¼
Claro Brand 1XRSS	22½	40
#1XRSS Trimmings	22	39½
Sole Crepe Trimmings	22	39½
#1X Thin Pale Crepe Trimmings	22	39½
R.C.M.A. Wtmkd. Crepe #16	26⅜	43⅞
R.C.M.A. Wtmkd. Crepe #17	25⅞	43⅜
R.C.M.A. Wtmkd. Crepe #18	24⅜	41⅞
Sole Crepe	22½	40

Wild Rubbers

(in cases and/or bales, at Rubber Reserve Co.'s option)

Delivery ex dock or ex warehouse at Rubber Reserve Co.'s option plus a uniform freight charge of one half cent (½¢) per pound based on net delivered weight for carload quantities (at the minimum weight provided for by the applicable freight rate) or one cent (1¢) per pound for less than carload quantities based on net delivered weights.

Grade	Civilian Use	Other Than Civilian Use
Uncut Fines—Crude	15	29
Cut Fines—Crude	15½	29¾
Cut Fines—Washed and Dried	22½	40
Islands Fine—Crude	14⅝	28¾
Islands Fine—Washed and Dried	22½	40
Weak Fine—Crude	14⅝	28⅛
Weak Fine—Washed and Dried	21⅜	38⅞
Cameta—Crude	9¾	20¼
Cameta—Washed and Dried	21⅛	38⅝
Upriver Coarse—Crude	12⅝	26⅛
Upriver Coarse—Washed and Dried	20¾	37¾
Manicoba—Crude	12¼	25⅜
Manicoba—Washed and Dried	20¾	37¾
Manicoba Choro (Ceara Scrap)—Crude	9⅝	21⅞
Manicoba Choro (Ceara Scrap)—Washed and Dried	18	35½
Central Scraps—Crude	12¼	25⅞
Central Scraps—Washed and Dried	19½	37
Caucho Ball—Crude	11⅝	24¾
Caucho Ball—Washed and Dried	19½	37
Panama Slab—Crude	9⅝	21⅞
Panama Slab—Washed and Dried	18	35½
Mangabiera—Crude	8½	19¾
Mangabiera—Washed and Dried	18	35½
Cameroons—Crude	16¼	31¼

Guayule

(in cases)

Delivery ex dock or ex warehouse or F.O.B. cars Manufacturer's plant at Rubber Reserve Co.'s option plus a uniform freight charge of one half cent (½¢) per pound based on net delivered weight for carload quantities (at the minimum weight provided for by the applicable freight rate) or one cent (1¢) per pound for less than carload quantities based on net delivered weights.

Grade	Civilian Use	Other Than Civilian Use
Guayule in carload lots	17½	31
Guayule in less than carload lots	18	31½

BALATA

(in cases and/or bales, at Rubber Reserve Co.'s option)

Delivery ex dock or ex warehouse at Rubber Reserve Co.'s option plus a uniform freight charge of one half cent (½¢) per pound based on net delivered weight for carload quantities (at the minimum weight provided for by the applicable freight rate) or one cent (1¢) per pound for less than carload quantities based on net delivered weights.

Grade	Civilian Use	Other Than Civilian Use
Surinam Sheet	42½	42½
Venezuelan Block	40¼	40¼
Manaos Block	38¾	38¾
Colombian Block	38¾	38¾
Panama Block	38¾	38¾
Peruvian Prime	38¾	38¾
Chicken Wire	23¼	23¼
Coquirana Washed and Dried	23¼	23¼
Coquirana Crude	19½	19½

SYNTHETIC RUBBER

(in cartons and/or bags)

Delivery F.O.B. producing plant or ex warehouse at Rubber Reserve Co.'s option plus a uniform freight rate of one half cent (½¢) per pound based on net delivered weight for carload quantities (at the minimum weight provided for by the applicable freight rate) or one cent (1¢) per pound for less than carload quantities based on net delivered weights.

Type	Civilian Use	Other Than Civilian Use
GR-M (Neoprene)	*	45
GR-S (Buna-S)	*	36
GR-I (Butyl)	*	33

* To be determined later.

LIQUID LATEX

(In cents per pound of total dry latex solids)

Delivery ex dock or ex warehouse, at Rubber Reserve Co.'s option, plus a uniform freight charge of one half (½) cent per pound, based on total dry latex solids weight, for tank-car and carload quantities (at the minimum weights provided below) or one (1) cent per pound for less-carload quantities based on the net dry latex solids weights.

Normal

	Civilian Use	Other Than Civilian Use
Tank Car Lots	26	43½
Carload Drums (Minimum car 11,500 pounds T.D.L.S.)	28¼	45¾
Less Carload 10 Drums (1,400 pounds T.D.L.S.) or more	28¾	46¼
1 Drum to 10 Drums (140 to 1,400 pounds T.D.L.S.)	29¼	46¾
Less than 1 Drum (1 to 140 pounds T.D.L.S.)	35¼	52¾

Creamed (Approximately 60%-65%)

Tank Car Lots	26¾	44¼
Carload Drums (Minimum car 19,300 pounds T.D.L.S.)	28½	46
Less Carload 10 Drums (2,400 pounds T.D.L.S.) or more	29	46½
1 Drum to 10 Drums (240 to 2,400 pounds T.D.L.S.)	29½	47
Less than 1 Drum (1 to 240 pounds T.D.L.S.)	35½	53

Centrifuged (Approximately 58%-63%)

Tank Car Lots	27¾	45¼
Carload Drums (Minimum car 19,500 pounds T.D.L.S.)	29½	47
Less Carload 10 Drums (2,400 pounds T.D.L.S.)	30	47½
1 Drum to 10 Drums (240 to 2,400 pounds T.D.L.S.)	30½	48
Less than 1 Drum (1 to 240 pounds T.D.L.S.)	36½	54

When approved by Rubber Reserve Co., carload prices may be applied to mixed full cars containing both normal and concentrated latex.

Heat-Concentrated (Approximately 70%-73%)

Carload Drums (Minimum car 26,000 pounds T.D.L.S.)	29½	47
Less Carload 10 Drums (1,700 pounds T.D.L.S.) or more	30	47½
1 Drum to 10 Drums (170 to 1,700 pounds T.D.L.S.)	30½	48
Less than 1 Drum (1 to 170 pounds T.D.L.S.)	36½	54

EXHIBIT "B"

REQUEST FOR PURCHASE OF CRUDE RUBBER, LIQUID LATEX AND BALATA

Office of the Rubber Director
War Production Board
New Municipal Building
Washington, D. C.

Attention: K. D. Fernstrom

Gentlemen:

I, ..., do hereby certify
(Name)
that I am ..... of
(Title or Position)
.....; that said
(Name of Manufacturer)
manufacturer will require for Civilian Orders:

.....

Types of
Rubber Crude Rubber Liquid Latex Balata
.....
Pounds Requested
.....
Pound Authorized
.....
to be delivered during the month of .....
194..; that said manufacturer will require for other than Civilian Orders:

.....
Types of
Rubber Crude Rubber Liquid Latex Balata
.....
Pounds Requested
.....
Pound Authorized
.....
to be delivered during the month of .....
194...

This request and our present inventories will be used under the provisions of Supplementary Order No. M-15-b, as amended, issued by the War Production Board or other official instructions of the War Production Board; that such materials, together with inventories now on hand, are to be used for the manufacture of such products and for no other purpose; that the materials which said manufacturer will use, consume or process will not exceed the limitations upon the use, consumption or processing imposed by said Supplementary Order No. M-15-b, as amended, and any other instructions issued by the War Production Board. I further certify that,

at the end of the period referred to above, total stocks on hand will not be in excess of a sixty-day working inventory or such other limitations as may be established by order of the Rubber Director.

The following types and grades of crude rubber, liquid latex and balata are requested if available:

For Civilian Orders:

For Other Than Civilian Orders:

.....
(Signature)

Subscribed and sworn to before me this ..... day of ....., 194...

.....
(Notary Public)

EXHIBIT "C"

Type:
Normal..... Creamed..... Centrifuged.....
Pounds Total Dry Latex Solids.....
Percentage of Concentration.....
Type of Container .....
For Delivery in.....Lots During the Month of ....., 194..
Indicate Specific Use .....
Usual Source of Supply.....

No. 18 on "Thiokol"-N

1. The Office of Rubber Director has adopted a program for the development of uses of "Thiokol"-N produced in government-owned plants, hereinafter designated as GR-P. It is anticipated that experience with GR-P will make it possible for manufacturers to use this material as a replacement for other types of synthetic, crude and reclaimed rubber. New prices have been established which should enable the manufacturer to conduct experimental work preliminary to the actual use of GR-P on production lines.

2. Effective April 15, 1943, GR-P will be sold to manufacturers by Rubber Reserve Co. at the prices listed below:

(A) GR-P will be sold by Rubber Reserve Co. at 30¢ per pound, for use in the manufacture of permitted or presently non-permitted end products wherever such use is feasible within the limitation of existing maximum prices established by the Office of Price Administration.

(B) GR-P will be sold by Rubber Reserve Co. at a price of 4¢ per pound for use in the manufacture of permitted end products in cases where it replaces all or a part of the reclaimed rubber content of such end products. This price will enable manufacturers to replace reclaimed rubber and produce permitted end products under the existing maximum prices established by the Office of Price Administration.

(C) GR-P will be delivered F.O.B. producing plants or ex warehouses at the option of Rubber Reserve Co., and to the foregoing prices there will be added a uniform freight charge of one-half cent (½¢) per pound based on net delivered weight for carload quantities (at the minimum weight provided for by the applicable freight rate) or one cent (1¢) per pound for less than carload quantities based on net delivered weights.

3. Attention is called to the fact that wherever GR-P is used in the manufacture of camelback or other permitted end products, it either replaces reclaimed rubber or extends the manufacturer's reclaimed allocation. Manufacturers should assume the responsibility of limiting sales to those outlets which have been educated to the use of end products processed from GR-P.

4. The amount of GR-P which a manufacturer purchases will not be charged by the Office of the Rubber Director against the manufacturer's allocation of synthetic, crude or reclaimed rubber, but will represent an addition thereto.

5. All requests for the purchase of GR-P should be addressed to the Office of the Rubber Director, War Production Board, New Municipal Building, Washington, D. C., and should state specifically the end product which will be involved and the amount of synthetic, crude or reclaimed rubber which will be replaced thereby.

6. GR-P will be distributed to manufacturers in accordance with the procedure outlined in Paragraphs *26-32*, inclusive, of Rubber Reserve Co. Circular No. 17, dated March *23*, 1943, a copy of which was mailed to all manufacturers on March *24*, 1943.

7. This Circular has been approved by the Office of the Rubber Director.

April 7, 1943.

Synthetic Rubber Type GR-P

MEMORANDUM

TO: Consumers of Government Synthetic Rubber

FROM: H. E. Simmons
Office of the Rubber Director
War Production Board

SUBJECT: Synthetic Rubber Type GR-P. Its Properties and Characteristics

The attached bulletin comprising pages 110.3 to 110.3-6 containing technical information on Synthetic Rubber Type GR-P has been prepared with the help of the Thiokol Corp.

GR-P is now handled by the Rubber Reserve Co. Where technical assistance is requested from industry, the Thiokol Corp. is cooperating to the extent of supplying any information available from data at their disposal or which can be obtained without extensive further investigation. They will not, however, be able to render extensive technical service on the application of GR-P.

It is suggested, therefore, that those who desire such assistance send their inquiries to this Office. We will endeavor to supply any information available or to suggest possible sources where assistance may be obtained. March *29*, 1943.

Synthetic Rubber Type GR-P, Its Properties and Characteristics

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Introduction

Synthetic rubber type GR-P was formerly known as "Thiokol" synthetic rubber type X. It is a rubber of the polysulphide class. GR-P has the distinction of being produced from raw materials that are available in relatively large amounts. Since manufacturing equipment is relatively simple, it is adaptable to being manufactured in converted plants. At the same time, the material has several very definite shortcomings that the [other] "Thiokol" synthetic rubbers do not. It is the purpose of this article to discuss the properties and characteristics of GR-P so that the rubber chemist will be familiar with these when considering its use.

Last spring when The Automobile & Rubber Industries Tire Committees were investigating materials for an Interim tire, this type of synthetic rubber was selected as a possible substitute for rubber for recapping tires. The material was tested for this purpose by a number of rubber companies during the spring, summer, and fall of last year. These tests showed tires could be retreaded with GR-P in commercial retread shops, and that the treads would give reasonably satisfactory service when operated at moderate speeds under average atmospheric conditions. It was introduced primarily for this purpose.

It is now being manufactured by du Pont in a converted plant at Deepwater for the Rubber Reserve Co. The manufacturing is being carried out with the technical assistance of the Thiokol Corp.

With decreasing temperatures GR-P stocks increase in hardness and decrease in flex resistance, becoming brittle in the usual test with a continuously falling temperature at about —20° F. A time effect is involved, however, so that in six days, for example, stocks will become brittle at temperatures between 0° and +10° F. The only feasible method, so far found, of counteracting this tendency is to employ mixtures with reclaim. Such blends are satisfactory for tread stocks and applications when oil resistance is not too critical a factor.

General Characteristics

GR-P is a light-yellow colored solid having a specific gravity of 1.39. It possesses a sharp characteristic odor and gives off a lachrymatory gas when hot. It should be processed on mills, calenders, etc., that are hooded and well ventilated. Except in stocks that contain a high percentage of reclaim rubber, it requires cooling in the mold to prevent sponging. When cured in open steam, extra pressure on the vulcanizer is necessary to prevent porosity. Because of the gas evolved at elevated temperatures, it is not practical to cure it by festooning in hot air ovens.

GR-P contaminates rubber very badly. Even small amounts of GR-P in rubber impart a characteristic odor to the rubber, and cause the rubber to give off a lachrymatory gas when hot. Because of this, great care should be taken to prevent scrap from getting mixed.

Compounding

A Typical Formula:

COMPOUND A

GR-P	100
Zinc Oxide	10
Channel Black	35
Stearic Acid	0.5
Benzothiazyl Disulphide	0.4
DPG	0.1
	146

Zinc oxide is the vulcanizing agent. It is used in amounts of from 5 to 10 parts on the GR-P. Varying the amount of zinc oxide does not vary the rate of cure.

Channel black is used as a reenforcing filler. Other blacks can be used. See table under "Behavior of Various Blacks" for a comparison of different blacks.

Stearic acid is used to aid in filler dispersion, to prevent sticking on mill rolls, calender rolls and in the mold during curing.

Benzothiazyl disulphide is a chemical plasticizer for GR-P, and the plasticity of the stock is controlled by varying the proportion of this material. For example, increasing the proportion from 0.3 to 0.6% on the GR-P will change a stiff stock to a very soft one. Tetramethylthiuramdisulphide is also a chemical plasticizer for GR-P and is used in substantially the same proportions as shown for benzothiazyl disulphide.

Diphenyl guanidine (DPG) serves to activate the plasticizing of the benzothiazyl disulphide. It exerts very little softening by itself.

Diphenyl ether in the amount of 5% on the batch may be used to further plasticize the compound and aid in the incorporation of the black. By its use the mill temperature may be kept down and the tendency to give off lachrymatory fumes decreased.

TENSILE PROPERTIES OF COMPOUND A

Press Cure @ 287° F. Minutes	Modulus 300%	Modulus 500%	Tensile Lbs./Sq. In.	Elongation %	Shore Hardness
10	185	295	550	1160	54
20	380	595	920	840	60
30	555	850	1110	680	62
40	700	1070	1240	590	63
50	780	1210	1250	520	64
60	815	....	1250	480	65

Behavior of Various Blacks in GR-P

Below is a rough comparison of the behavior of different types of blacks in GR-P.

BASE FORMULA

GR-P	100
Zinc Oxide	10
Stearic Acid	0.5
Benzothiazyl Disulphide	0.4
DPG	0.1
	111

Sheet cure 40 minutes at 287° F.

	Modulus 300%	Modulus 500%	Tensile Lbs./Sq. In.	Elongation %	Shore Hardness
40 Parts Black					
Medium Channel	820	1240	1240	500	68
Coarse Channel	840	1205	1265	540	69
Semi-Reenforcing	935	....	1140	440	67
Fine Thermal	575	850	1005	610	61
Coarse Thermal	585	830	870	550	60
60 Parts Black					
Medium Channel	1395	....	1455	330	79
Semi-Reenforcing	1365	....	1365	300	77
Fine Thermal	875	....	1090	440	70
Coarse Thermal	830	....	935	370	68

Laboratory abrasion tests show that channel blacks give the best abrasion resistance followed by the semi-reenforcing black. The soft or thermal blacks show the poorest abrasion resistance. This tendency is shown by the data in the table below obtained on compounds made by adding carbon blacks to the Base Formula given above. The tests were made with a du Pont (Williams) abrader.

Type of Black	Parts per 100 Pts. GR-P	Abrasion Index (C.C./H.P./Hr.) 40 Mins./ 287° F.	60 Mins./ 287° F.
Medium Channel	30	451	527
	40	462	475
Semi-Reenforcing	40	670	675
	60	562	600
Fine Thermal	60	790	745
Coarse Thermal	60	886	825

Bonding GR-P

GR-P stocks are very dry and lack tack. They do not bond readily to themselves when cold, and this presents a problem in using the material for building up parts from calendered sheets. This can be helped somewhat by the use of higher amounts of benzothiazyl disulphide and by washing with orthodichlorbenzene. (We have asked for expert opinion regarding the toxicity of orthodichlorbenzene. In the meantime reasonable precautions should be taken in handling this solvent.)

In making splices with retreads, it is not necessary to wash, since freshly cut surfaces are stitched together, and since there is considerable movement of the stock in molding the tread design.

Aging Characteristics

a. CRUDE MATERIAL

GR-P, in the crude state, tends to harden up or "freeze" even at room temperatures. This change is comparable to the freezing of crude natural rubber at low temperatures. This freezing does not injure the GR-P, but it does sometimes necessitate thawing it out before mixing.

b. COMPOUNDED UNCURED STOCK

Compounds mixed from GR-P also tend to harden up or "freeze" at room temperatures with age. Such hardened stocks can be thawed at temperatures around 120° F. This hardening of the raw stock is greatly lessened by admixture with reclaimed rubber.

c. CURED STOCKS

The tendency of cured stocks to harden up with age is much less than for uncured stocks. This tendency is quite pronounced in undercured stocks and less pronounced in the optimum and overcures.

CHANGE IN SHORE HARDNESS WITH AGE AT ROOM TEMPERATURE (NORMAL CHANNEL BLACK STOCK)

Cure @ 287° F. Min.	Original	1 Week	1 Month	3 Months
5	55	66	90	98
10	60	61	82	98
20	63	64	68	92
30	64	65	67	82
50	65	66	67	70

This same channel black stock, however, after having hardened with age at room temperature, softens readily when heated slightly or when flexed sufficiently to warm it. This heat softening after aging is shown by the following data:

Cure @ 287° F. Min.	Aged 3 Months	Plus 30 Mins. at 100° F.
5	98	77
10	98	75
20	92	68
30	82	68
50	70	69

Freeze Characteristics

The low temperature characteristics of GR-P have been the subject of considerable investigation. At temperatures down to −35° F. the brittle point is a function of time. Tests in the range −5° F. to −20° F. show that the time for the stock to become brittle is fairly uniform. At the lower temperature, it becomes brittle somewhat faster than at the higher temperature. At temperatures between −20 and −30° F. the time to become brittle is fairly short. This is illustrated by data shown below:

GR-P STOCK. Temperature	NO RECLAIMED RUBBER Time to Become Brittle
−5° F.	24 Hours
−20	20 Hours
−30	5 Hours

No data are available on the time for the stock to become brittle in the —5 to —30° F. range. Qualitative observations indicate that at the higher temperatures the time is considerably longer. This range should be investigated before GR-P is considered for uses where it will not be blended with reclaim.

Blends of GR-P with reclaimed rubber possess better freeze resistance than the straight material.

GR-P—RECLAIM BLEND.

Time for stocks to become brittle at −20° F.

Parts Reclaim per 100 GR-P	Time to Become Brittle
0 (Control)	20 hours
20	111 hours
40	Did not break after 208 hours
60	Did not break after 208 hours

Solvent Resistance

GR-P possesses good solvent resistance when used straight. The fact that it must be blended with rubber or reclaim to improve its freeze resistance greatly limits its application as an oil-resistant rubber. In fact such blends are not recommended for oil-resistance. They should not be used without giving thorough consideration to the application and the service requirements.

Fixed Government Prices*

	Price per Pound: Civilian Use	Price per Pound: Other Than Civilian Use
Balata		
Manaos Block	$0.38¾	$0.38¾
Swinam Sheet	.42½	.42½
Guayule		
Guayule (*carload lots*)	.17½	.31
Latex		
Normal (*tank car lots*)	.26	.43½
Creamed (*tank car lots*)	.26¾	.44¼
Centrifuged (*tank car lots*)	.27¾	.45¼
Heat-Concentrated (carload drums)	.29½	.47
Plantation Grades		
No. 1X Ribbed Smoked Sheets	.22½	.40
1X Thin Pale Latex Crepe	.22½	.40
2 Thick Pale Latex Crepe	.22	.39½
1X Brown Crepe	.21⅞	.38⅞
2X Brown Crepe	.21⅛	.38⅛
2 Remilled Blankets (Amber)	.21¼	.38¾
3 Remilled Blankets (Amber)	.21⅛	.38⅛
Rolled Brown	.18	.35½
Synthetic Rubber		
GR-M (Neoprene GN)	†	.45
GR-S (Buna S)	†	.36
GR-I (Butyl)	†	.33
Wild Rubber		
Upriver Coarse (crude)	.12⅝	.26⅛
(washed and dried)	.20¼	.37¾
Islands Fine (crude)	.14⅝	.28¼
(washed and dried)	.22½	.40
Caucho Ball (crude)	.11⅝	.24¾
(washed and dried)	.19½	.37
Mangabiera (crude)	.08½	.19¾
(washed and dried)	.18	.35½

*For a complete list of all grades of all rubbers, including crude, balata, guayule, synthetic, and latex, see Rubber Reserve Co. Circular 17, p. 169.

†To be determined later.

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Crystex prevents bloom in uncured rubber stocks. It does not dissolve in rubber but will "stay put" at temperatures usually prevailing during storage periods. Crystex is of outstanding value when employed in the manufacture of stocks to be used for repair materials, in retread stocks, valve-patch frictions, and other products.

The characteristics of Crystex indicate that further uses may be found for this product in the rubber making industry.

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LATIN AMERICA

BRAZIL

Some sections of the local press believe Brazil is again to be disappointed in her hopes to regain her place as chief producer of raw rubber. First, the plantations in the Far East ousted her from that position, and now, when circumstances seem to favor Brazil once more, the specter of synthetic rubber threatens. But, says an editorial in the *Revista da Quimica Industrial*, there is really nothing to fear. After all, wild rubber does not stand out as a source of wealth for Brazil; it should simply be regarded as a generous gift of nature.

We are now in a technological era, it is pointed out, and Brazil should cease depending on natural factors. Instead it should face the future with confidence with regard to synthetic rubber, since the country is well supplied with the raw material needed for its manufacture on a large scale, namely ethyl alcohol. It was alcohol, the editorial recalls, which gave Russia its ample foundation for a synthetic rubber industry, and discussions in the United States indicate that there also is a growing trend toward alcohol as a base for synthetic rubber; and the way for Brazil to fight the specter of synthetic rubber is to make it.

In a recently published statistical review of the twelve principal products exported by Brazil during the first four months of 1942, rubber did not figure. The twelve commodities represented over 80% of the total value of the exports, and the twelfth ranking item, vegetable oils, had a value of 44,718 contos of reis ($23,200), or 1.7% of the total. The value of rubber exports for the period was 39,065 contos of reis ($20,500), or approximately 1.5% of the total value of Brazilian exports in the first four months of 1942.

The Sociedade Comercial Latex do Brasil, S. A., Matto Grosso, was recently formed to extract rubber in Matto Grosso. The firm intends to erect a factory for preparing *Hevea* rubber in the form of smoked sheet. It will also extract *mangabeira* rubber in the southern part of the state. Some of the rubber obtained in Matto Grosso is reported to be of excellent quality, suitable for tires.

On the Amapa rubber lands, Acre, also, a factory for treating raw rubber was recently opened with daily capacity of 100 kilos (220 pounds) of sheet rubber. It is planned shortly to increase the amount to 300 kilos (660 pounds).

Because of negotiations between Brazil and the United States, Argentina had been unable to obtain automobile tires, although certain rubber goods, including inner tubes, could still be bought. However as a result of large-scale smuggling of inner tubes into Argentina, the Brazilian Government has forbidden all trade in rubber goods with neutral countries.

There are indications in Brazil of racketeering attempts in rubber planting experiments. At any rate Feliberto Camargo, director of the rubber experiment station, Northern Agronomical Institute, issued a warning that the Brazilian Rubber Bank would not finance so-called rubber planters planning to experiment on new plantations with rubber seedlings deemed unsuitable for Amazon conditions.

NICARAGUA

In line with efforts to speed up raw rubber production, James Wark, United States rubber expert, was sent to Nicaragua to take charge of the local rubber experiment station.

Major Leon Ellzey, the Firestone plantations representative, recently arrived in the United States and will report on rubber possibilities in Nicaragua, which are held promising.

Exports of crude rubber from wild trees in Nicaragua totaled 485 tons in 1942, against only 55 tons in 1941.

By a decree issued March 3, 1943, President Anastasio Somoza abolished all taxes on crude rubber.

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MEXICO

The reciprocal trade agreement which after prolonged negotiations was finally concluded between the United States and Mexico on December 23, 1942, went into force on January 30, 1943, and will remain effective for three years unless terminated earlier in accordance with special provisions. Among its reciprocal benefits are tariff reductions and bindings of existing customs treatments on various enumerated products. Reductions in duty, ranging from 10% to as high as 75% were granted by Mexico on a long list of United States products, among which are tire repair kits; cotton tire fabric; pneumatic tires weighing up to 10 kilograms (22 pounds) each; automobile wheels with and without tires and inner tubes; and pneumatic tires whose inner circumference has a diameter of more than 60 centimeters (23.5 inches).

Existing rates of duty will continue on numerous other American products including decorated and undecorated sheets, tubes and rods of ebonite, gutta percha, and similar pastes [doughs, dispersions], unspecified articles of pastes similar to gutta percha and rubber, machinery belting of rubber or rubber-impregnated cloth, and pneumatic tires weighing over 10 kilograms each.

The United States on its side reduces tariffs on a wide range of Mexican products including naphthenic acids and specified forms of zinc oxide and will maintain on the free list various other products including guayule rubber.

A mission was recently sent to Mexico by the United States Board of Economic Warfare to consider increasing the production of the *Chilte* plant, a bushlike tree hitherto only found in Western Mexico, which yields a rubber-bearing sap. Reports from Washington indicate that the rubber has a high resin content; experts consider it useful especially for mixing with synthetic rubber. It seems that this type of rubber was used to some extent in the first World War and for some time thereafter.

EL SALVADOR

To promote domestic manufacture of rubber goods, the import duties on a variety of rubber compounding ingredients have been considerably reduced by decree effective November 30, 1942. The new rates per 100 gross kilo (220 lbs.), in United States dollars, as compared with the old rates (in parentheses) follow: clay earth, not specified, 2.50 (18.60); kaolin or china clay, 2.50 (18.60); litharge, 5 (10.40); white zinc oxide, 5 (10); powdered sulphur, 2.50 (18.60). At the same time two new items have been added to the tariff list: synthetic coloring material, especially for rubber; and products for use in the manufacture of rubber and not elsewhere specified, as accelerators, retarders, antioxidants, and plasticizers; the duty in each case is $5 (U. S. currency) per 100 pounds.

VENEZUELA

The United States need expect no rubber from Venezuela this year. According to the contract between the Rubber Reserve Co. and the Venezuelan Government, Venezuela gets the first 800 tons of rubber collected each season. The program for the current season, which ends in April, started late, and only about 100 tons of rubber were produced in all. But it is expected that 1,000 tons will be gathered in the next season, which begins in October, and of this amount the United States will get about 200 tons. Venezuela has exported no rubber for almost 20 years.

Caracas has a tire retreading plant, Tyresoles de Venezuela, which has a maximum capacity of 800 tires per month. However, because of the shortage of raw materials, about 400 tires are now actually being retreaded in a month.

War production requirements have given great stimulus to improvements in machine design.

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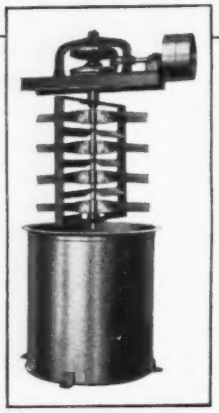

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ARGENTINA

By a decree, effective February 22, 1943, the Argentine Government has taken control of all rubber in the nation. A special committee also has been appointed and empowered to expropriate raw rubber stocks which should be used for articles essential to national defense; articles for sanitary medical uses; in containers for meat and other perishable Argentine export products; and such articles as the committee considers indispensable in an emergency.

The Goodyear, Firestone, and Michelin companies are to use their present stocks for tires only and must report to the rubber distribution committee each month.

ECUADOR

Thanks to the high prices received by rubber tappers in Ecuador, outputs continue satisfactory despite the rainy season. In 1941 Ecuador shipped 1,500 tons of rubber; since then production and also exports have increased substantially, but figures for 1942 or the early months of 1943 are not available. Incidentally, it is learned that numerous complaints have been received from importers in the United States about the presence in the rubber of extraneous material, and steps are being taken to improve the quality.

FAR EAST

CEYLON

Rubber Industry Data

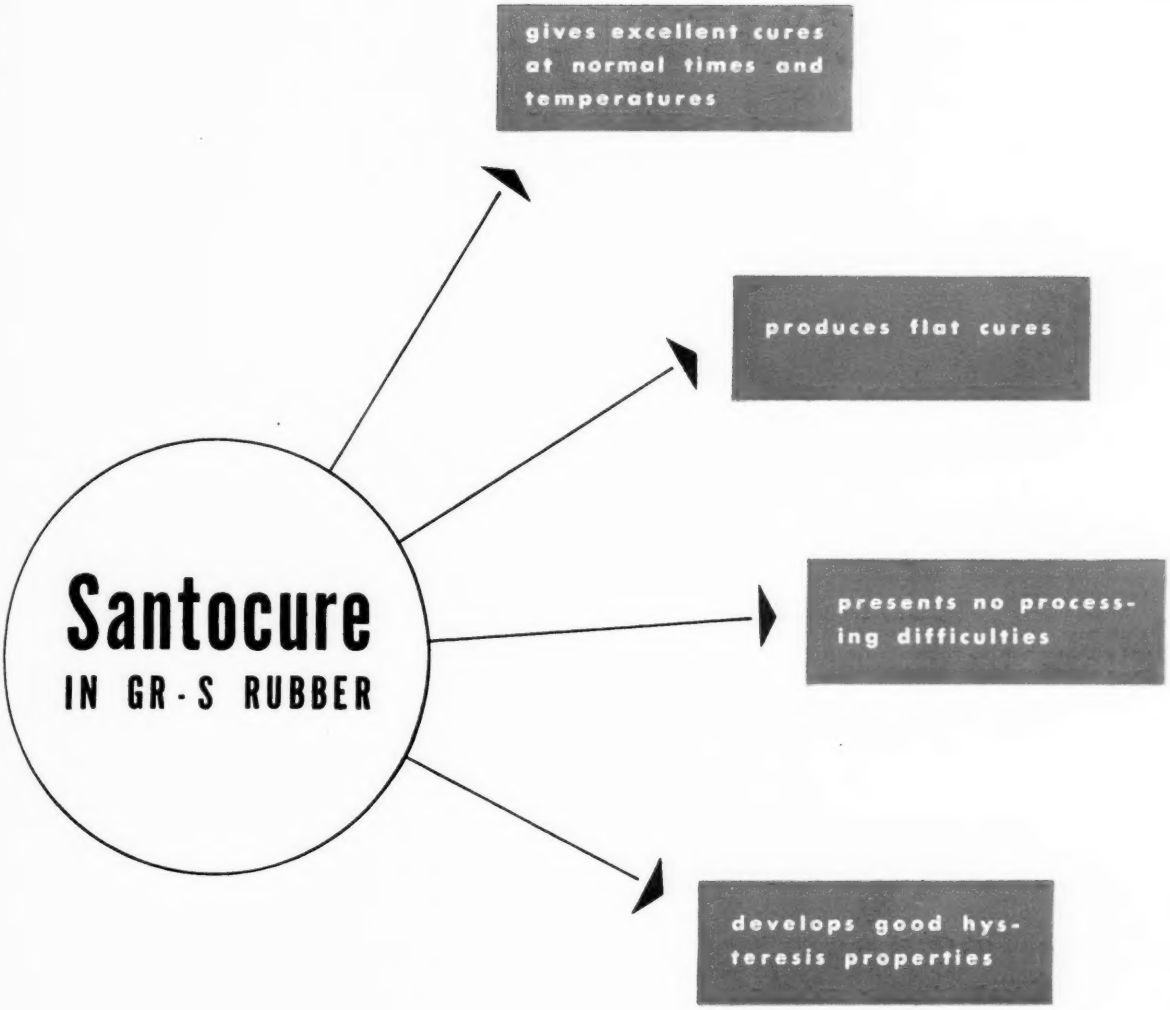
In 1941 Ceylon's export quota was 114,450 tons, but the amount of domestic rubber actually exported was 100,823 tons, against 88,168 tons in 1940. Complete export figures for 1942 are not yet available, but to the end of November, 1942, shipments totaled 104,594 tons. By the end of the first week of December a further 2,080 tons had been shipped, and it was estimated that another 15,000 tons might possibly have been exported before the end of the month. According to these figures then, Ceylon in 1942 probably sent out about 121,674 tons of rubber.

In 1941 about 32 tons of latex were also exported, as compared with 11 tons in 1940. What amount of latex—if any—was shipped in 1942 is not known.

Despite the fact that shipping latex is very profitable and that, moreover, there has been an increasing demand for it from India, local producers are uninterested in this form of preparing rubber. The Rubber Research Scheme, Ceylon, therefore is and remains the only producer of latex in Ceylon. The report of the Ceylon Department of Agriculture states that a new creaming plant was installed at Dartonfield at the end of 1941 which has increased the productive capacity of the organization considerably; it is now possible to produce 3,000 gallons of latex (about 18,000 pounds) a month.

The report of the Rubber Research Scheme of Ceylon during 1941 indicates that this organization has been actively stimulating the local tire retreading industry, and most of the small firms now operating retreading shops in Ceylon began under the Scheme's technical guidance.

Interest in the production of various rubber goods is apparently also growing, and frequent requests were received by the Scheme during the year for advice on the manufacture of tire compounds and minor vulcanized rubber articles.



These are some of the results Santocure is producing in GR-S (Buna S) compounds. For full details, inquire: MONSANTO CHEMICAL COMPANY, Rubber Chemicals Department, Akron, Ohio.

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Soon after the outbreak of hostilities Ceylon began to suffer from a shortage of the important coagulants, formic and acetic acids, (particularly the former) which were supplied chiefly by Europe. Formic acid had displaced the once universally used acetic acid and for years had been the most favored coagulant, but as it was in especially short supply, acetic acid once more began to be generally used. However, arrivals of coagulant were uncertain, and since the manufacture of acetic acid is a comparatively simple matter, experiments with a view to local production were undertaken; now it is learned that Ceylon is about to open a factory for acetic acid and expects to start production shortly.

According to an arrangement made by the Secretary of State with the Government of Ceylon, all scrap rubber collected locally is to go to India where it will be reclaimed. For 1943 the Government of Ceylon has bound itself to supply 125,000 pounds of old rubber, and since the periodic allocation of tires to civilians in Ceylon will to some extent depend on the amount of scrap rubber sent from here to India, all owners of motor vehicles are being urged to help the government's effort by giving up all unserviceable tires.

In connection with the drive for increased rubber production in Ceylon, it is reported that rubber planters have decided to subject 20% of their rubber trees to such an intensive system of tapping as to amount to "slaughter" tapping. This drastic method is expected to lead to an increase in the 1942 output of at least 28,000 tons, as compared with the total for 1941, but this will be achieved at the cost of the certain ruin, after a few years, of the trees involved. The government, it is said, has undertaken to make compensation to estate owners for replanting.

New Planting

To increase Ceylon's rubber output the International Rubber Regulation Committee has decided to permit this island as well as India to plant new rubber up to 5% of the total planted area. It has also been agreed that any new planting in excess of the amount granted, which in the case of Ceylon would be more than 30,260 acres, will be covered by an additional acreage allowed under Article 12 (c) (2) of the International Agreement. This article covers an excess of new planting amounting to one-fifth of the permissible area for new planting. [Total would then be 6%.]

The new planting rights will be apportioned among applicants according to their capacity to plant, subject to the proviso that food crops must be interplanted with the new rubber and that there must be no diversion of labor from rubber production.

Incidentally labor is a troublesome problem for rubber planters at present, rendered doubly difficult of solution by the British Government's request for a program of more intensive tapping and the fact that the Government of India since 1939 has prohibited the emigration of labor to Ceylon. Efforts are now being made to have this ban relaxed in order to be able to obtain from India the necessary extra labor.

INDIA

Under the stimulus of wartime demand, rubber production in India has been increasing steadily since 1939. In the fiscal year 1939-1940 the output was 31,390,700 pounds, a record for the country, exceeded, however, by the following year's production of 35,530,400 pounds. The area planted to rubber was given as 138,200 acres in the 1940-41 period, increased to about 150,000 acres in the next year; and thanks to the efforts of the Rubber Production Board recently appointed by the Indian Government, it is expected that during 1943 the figure will be 200,000 acres. What proportion of the rubber produced will be available for export is not known, but the growing demands of the local rubber manufacturing industry may be expected to keep the amount relatively small.

The most important rubber producing region in South India is the State of Travancore estimated to have a total acreage of close to 100,000 acres, from which about 24,000,000 pounds of rubber were obtained in 1941. This State also has a rubber factory, the Travancore Rubber Factory which is partly government-owned and manufactures cycle tires, tubes, surgical and mechanical goods, and other articles needed for defense.

AFRICA

From different parts of Africa come reports of the various works now being undertaken to encourage the production of rubber. At Konongo, Gold Coast, a school has been established for training tappers and another for processing rubber. Tapping drives have been organized among school children, which in Ashanti, it is said, resulted in the collection of 200 pounds of rubber from local trees.

Kenya's moribund rubber industry has been revived by the efforts of European supervisors who have trained African workers in the proper tapping and preparation methods; and in the coastal areas wild rubber collection has been showing a gratifying increase.

Recently a British expert was sent to French North Africa to discover suitable means of extracting and purifying rubber from certain cactus plants found on the Atlas Mountains. These plants are said to be rich in rubber which, however, has a high resin content, and the task of purification as well as of extraction has offered considerable difficulty. Prior to the Allied invasion of these parts, research work in these directions had been carried out by the Vichy Government which had erected an experimental plant there.

The Ministry of Supply has also sent missions to Northern Rhodesia and Nigeria to stimulate rubber production. Nigeria many years ago produced a certain amount of rubber chiefly from wild plants; however since there was for a long time no demand for Nigerian rubber, tapping completely ceased, and now it is necessary to teach the native how to tap and prepare rubber.

Dielectric goods, such as heavy switch mounting boards and tubular and extruded rods as well as various kinds of molded articles, including containers, are now being produced from plastics in the Union of South Africa, it is reported. The plastics used for these goods, manufactured by a South African firm in Johannesburg, are made wholly from domestic raw materials.

The shortage of rubber has led to the exploration of the value of other products as substitutes for rubber for various purposes. Thus the South African Forest Products Institute is reported to have found that several local woods, as corkwood, mgoma, and sanga, can be advantageously used to replace cork and rubber stoppers.

EGYPT

A military proclamation of November 23, 1942, provides that only merchants who are entered in the Registry of Commerce and have never been found guilty of contravening the various decrees regarding supplies will be permitted to deal in various commodities, including raw rubber and automobile tires.

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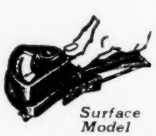

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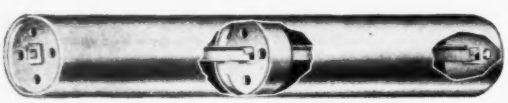
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Editor's Book Table

NEW PUBLICATIONS

"Witco No. 20 Softener in Buna S (GR-S)." Report 43-1. H. F. Schwarz. Wishnick-Tumpeer, Inc., New York, N. Y. 16 pages. Comparative physical test results with Witco No. 20 Softener (asphaltic type), pine tar, and a coal tar softener in loadings from five to 15 parts on 100 parts of Buna S in a tire tread formula are reported in this bulletin. Data were obtained on plasticizing action, hardness, modulus, tensile strength before and after aging, resilience, elongation, tear resistance, and abrasion resistance. The tests show that the Witco No. 20 Softener produces a softer mixed stock in comparison with equal amounts of the other two softeners and therefore may be used in smaller quantities. A comparison of the three types of softeners on the basis of the same plasticity is given to show the better physical properties of the stock using the Witco No. 20 Softener, by virtue of its use in smaller amounts.

"(i) α—Methylenic Reactivity in Olefinic and Polyolefinic Systems", by E. H. Farmer; **"(ii) The Course and Mechanism of Autoxidation Reactions in Olefinic and Polyolefinic Substances, Including Rubber"**, E. H. Farmer, G. F. Bloomfield, A. Sundralingam, and D. A. Sutton; **"(iii) Ionic and Radical Mechanisms in Olefinic Systems, with Special Reference to Processes of Double-Bond Displacement, Vulcanization and Photo-Gelling"**, E. H. Farmer. *Publication No. 26.* British Rubber Producers' Research Association, 19 Fenchurch St., London, E.C.3, England. 24 pages. The first paper deals with a variety of substitution reactions of olefins and polyolefins which occur at the α—methylene groups of these systems. Peroxidation reactions, vulcanization with dibenzoyl peroxide, reactions of quinones, sulphur vulcanization, double-bond displacement, etc. are discussed to show the considerable substitutive reactivity of olefinic systems, and especially of polyolefinic materials such as rubber. In the second paper the absorption of molecular oxygen in monoolefinic and unconjugated polyolefinic materials is covered. The consequences with respect to ionic reactivity and physical properties of olefinic substances which would result from the assumption that the three-carbon system exists in a mesomeric state corresponding to specified electron shifts are treated in the section on double-bond displacement. Radical mechanisms of bridging reactions and double-bond saturation during vulcanization and of cross-linking and radical addition reactions in the photo-gelling of rubber are also covered.

"Paints and Other Protective Coatings for Tires." Letter Circular LC-709. Archibald T. McPherson and Eugene F. Hickson. United States Department of Commerce, National Bureau of Standards, Washington, D. C. 6 pages. Information on the real and supposed functions which paints and other coatings may serve in use at present as protective coatings for tires is discussed in this bulletin.

"Styraloy 22." The Dow Chemical Co., Midland, Mich. 22 pages. A new synthetic elastomer designed to replace rubber in many applications vital to the war effort is described in this bulletin. Styraloy is reported as having the low-temperature flexibility of rubber, electrical properties approaching those of polystyrene, excellent heat and corona resistance at elevated temperatures, a low specific gravity of 0.96, and the complete versatility in fabrication procedure characteristic of thermoplastic materials. Details of fabrication methods, including a scale drawing of a typical die and torpedo successfully used on wire coating operations, are given. Under mechanical properties, tables and graphs are used to explain tensile strength, elongation, hardness, compression set, and low and high temperature flexibility. Electrical properties are treated in the same manner. General properties and solvent resistance of Styraloy are given in separate tables. The bulletin is concluded with information on compatibility, availability, specifications, and some supplementary data on cold flow.

"Cabot Carbon Blacks in GR-P—Reclaim Stocks." B. A. Wilkes. Godfrey L. Cabot, Inc., Boston, Mass. 44 pages. The results of a preliminary basic study of the effect of various channel blacks in GR-P ("Thiokol" X)-reclaim blends are reported in this publication. Blends of GR-P-reclaim in the ratios of 70:30, 50:50, and 30:70 are examined in some detail with respect to milling properties, optimum quantity of black (Spheron #9), grades of black, dispersion, physical tests, cure, and freeze resistance. The general conclusion is that except for harsh blacks, all other grades may be used with about the same degree of ease as far as milling is concerned, and it is the end use of the product that determines whether a very soft, a medium, or a hard channel black is to be employed. Physical test results are effected in about the same manner for the different blacks as in natural rubber, but the complicating effect of the benzothiazyl-DPG combination, which is the plasticizer for GR-P and at the same time the accelerator for the reclaim, must be taken into account. With increased reclaim content, halving the benzothiazyl-DPG combination was indicated as having advantages. An investigation of carbon black loading based on either the rubber hydrocarbon or the GR-P-reclaim content showed that the physical properties with the exception of freeze resistance, rebound, and resistivity varied much less when the loading was based on the GR-P-reclaim content. Improved freeze resistance was obtained with up to equal parts of reclaim, after which no further improvement was obtained. General information on the reclaim and test methods used concludes the bulletin.

"Compounding Synthetic Rubbers." Continental Carbon Co., 295 Madison Ave., New York, N. Y. 62 pages. A series of nine laboratory reports on the various aspects of compounding Buna S, "Thiokol" N, and Neoprene GN as well as all reclaim tread stocks with different grades of carbon blacks comprises this publication. One report on Buna S includes an interesting discussion of the structure and behavior of this rubber and then gives a thorough evaluation of the physical properties obtained with carbon blacks ranging from very soft to very hard. Another report gives the results of a comparison of competitive low heat generating blacks in which four competitors' grades and Continental AA were rated as about the same, Continental AAA and one competitor's grade were rated as slightly superior, and one competitor's grade was rated as a medium instead of a soft channel black. A report on milling procedure with Buna S confirmed the value of remilling carbon black stocks of this rubber after a 24-hour stand. Attention is called to the importance of volume cost considerations in building compounds with Buna S in order to get maximum value at the lowest cost. A report on compounding "Thiokol" N shows that standard channel blacks seem to be best for this rubber, and another report shows that Continental and competitors' grades give about the same results with this synthetic. One report on all reclaim tire treads recommends the use of standard instead of soft channel blacks if processing facilities warrant, and the other report gives an evaluation of competitors' and Continental soft channel blacks in which the same results in rating the blacks as mentioned with the Buna S are reported. Any one or all of these reports may be obtained from Continental Carbon Co.

"How to Plan Your Postwar Objectives." The Eddy-Rucker-Nickels Co., Inc., 1400 Massachusetts Ave., Cambridge, Mass. 4 pages. **"Tirex Welding Cables."** Simplex Wire & Cable Co., Cambridge, Mass. 4 pages. **"Special Coatings & Cements."** Union Bay State Co., 50 Harvard St., Cambridge, Mass. 6 pages. **"Automotive Service Manpower Problems and Suggested Procedure for Meeting Them."** National Automobile Dealers Association, 1026 17th St., N.W., Washington, D. C. 12 pages. **"Tensilastic."** American Wringer Co., Woonsocket, R. I. 4 pages. **"List of Inspected Fire Protection Equipment and Materials."** Underwriters' Laboratories, Inc., 207 E. Ohio St., Chicago, Ill. 174 pages. **"How to Recap with F Grade Capping Stock."** The Rubber Manufacturers Association, Inc., 444 Madison Ave., New York, N. Y. 1 page. **"Questions and Answers Regarding Operation under the Controlled Materials Plan."** War Production Board, Washington, D. C. 8 pages. **"Strauss Head and Body Protection for Men and Women Industrial Workers."** The Strauss Co., 925 Liberty Ave., Pittsburgh, Pa. 5 pages. **"Soldiers on the Production Front.** Workers of the Plymouth Rubber Co., Inc." Plymouth Rubber Co., Inc., Canton, Mass. 4 pages.

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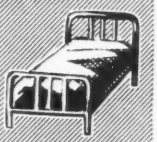

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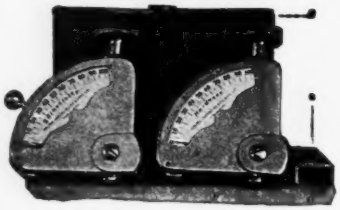

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"The Effect of the War on Income, Wages and Living Costs." National Association of Manufacturers, 14 W. 49th St., New York, N. Y. 30 pages. This report has as its purpose the use of lessons learned from the last war and analysis of statistics from 1939 through 1942 on salaries and wages, cost of living, employment, and the effect of taxes on corporation income, for the formulation of policies that will reduce the dangers of inflation to a minimum. Adherence to the War Labor Board's "Little Steel" decision as a basis for granting wage increases, more effective price controls, and no further increase in the tax burden on corporations are indicated as basic policies that should be adopted to cope with the inflation problem. Numerous charts and tables are included.

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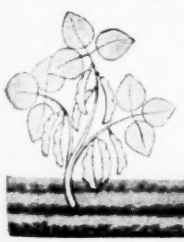

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2,313,721. Rubber-Band Lock and Release Means for a Toy Gun, Which Includes a Frictionally Controlled Pivoted Wheel. E. C. Borth, Watertown, Wis.

2,313,812. Scuff Plate for a Vehicle Body, Including an Elongated Plate of Sheet Metal with a Section Curved Upwardly That Has a Rubber Covering at the Outer Side. J. F. Duffy, assignor to Duffy Mfg. Co., both of Holland, Mich.

2,313,948. Dart-Like Glider Adapted to Be Catapulted by an Elastic Member. E. Lambert, Concordia, Kans., assignor to N. E. and D. E. Walker and L. B. Walker, doing business as American Junior Aircraft Co., Portland, Oreg., a copartnership.

2,314,057. Toy Boat with a Buoyant Base Member with an Inflatable Rubber Sack Attached. S. J. Slotsky, Sioux City, and A. F. Pingsten, Rock Rapids, both in Iowa.

2,314,085. Drive Assembly for Electric Locomotives, Including a Pair of Hollow, Elastic Tension and Compression Members Closed at One End and Open at the Other. N. E. Gee, Narberth, Pa.

2,314,108. A Power Megaphone System including a Carbon Microphone Floatingly Supported between Two Rubber Angular Washers on a Mounting Bracket. R. Silverman, Pittsburgh, Pa.

2,314,315. A Coupling Gland, Including a Coupling Member of Flexible Rubber or the Like and a Securing Member of Rigid Material. C. C. Scheele, assignor to Easy Washing Machine Corp., both of Syracuse, N. Y.

2,314,383. Fountain Pencil for Distributing Mucilage, Etc., Which Includes a Soft Rubber Perforated Nipple Having Its Shank Encasing the Sleeve. E. C. Berners, deceased, late of Fond du Lac, Wis., by C. Pilon, administratrix, assignor to M. P. Braun, both of Fond du Lac, Wis.

2,314,545. Glove with Elastic Clasping Means at the Wrist. E. C. Lindfelt, Des Moines, Iowa.

2,314,644. Railway Car Truck Having Horizontally Disposed Metallic Elements and Rubber Elements Bonded between. E. E. Adams, Chicago, Ill., and H. M. Pflager, St. Louis, Mo.

2,314,650. Bag for Therapeutic Purposes Adapted to Hold Liquid or Pieces of Ice, Having a Body with Elastic, Flexible Walls. P. S. Madsen, Bethany, assignor to Seamless Rubber Co., New Haven, both in Conn.

2,314,700. Fowl Picker with Movable Member Having Sponge Rubber Teeth or Projections Adapted to Remove Feathers from the Fowl. F. Hanshaw, Port Huron, Mich.

2,314,716. Bead Forming and Printing Device Including Projecting Forms and Means for Rolling a Thin Rubber Article upon Itself from One End of the Form toward the Other. Y. H. Kurkjian, Hawthorne, N. J., assignor to J. Schmid, Inc., New York, N. Y.

2,314,862. Fruit Pitting Chuck Including a Flat Rigid Base Plate with a Plurality of Spaced Apertures and Pins and a Rubber Sheet Apertured to Receive and Pass the Pins. G. W. Ashlock, Jr., Oakland, Calif.

2,314,866. Form for Casting and Shaping Masonry and the Like Having an Axially Slidably Mounted Sleeve Formed of a Continuous, Integral, Resilient, Rubber-Like Material. G. B. Bosco, Chicago, Ill.

2,314,880. Wire Screen Supported by an Elongated Flock of Hard Rubber Carried by a Support with a Strip of Relatively Soft Rubber Vulcanized to the Top of the Hard Rubber Elongated Block. R. D. Heller, Columbus, O.

2,314,914. Parachute Delivery Apparatus Having a Shock Absorber with an Inflated Pneumatic Tire between Two Disks of Plywood Enclosed in a Fabric Casing. H. Wilson and W. P. Yarborough, both of Fort Benning, Ga.

2,315,054. Fingergrip Wiper for Bowling Balls, Including a Cylindrically Shaped Mass of Compressible Sponge Rubber. W. E. Heber, Wilmington, Calif.

2,315,235. Fan Blade Attachment for the Flywheel of a Sewing Machine, Having an Annular Rubber Casing and a Plurality of Rubber Fan Blades Projecting Radially. R. Weidner and J. D. Yaro, both of New York, N. Y.

2,315,391. Cushion Including a Relatively Flat Body of Spongy Rubber-Like Material with Convex Upper and Lower Surfaces. G. W. Blair, assignor to Mishawaka Rubber & Woolen Mfg. Co., both of Mishawaka, Ind.

2,315,592. Leak-Proof Cell Having a Casing of Moisture-proof Insulating Material and Provided with Circuit Terminals at Opposite Ends Including a Cup-Shaped Shell of Resinous Plastic Material. W. W. Cargill, Madison, Wis., assignor to Ray-O-Vac Co., a corporation of Wis.

2,315,615. Molded Panel Including a Base Portion Composed of a Plurality of Laminated Sheets of Kraft Paper Impregnated with a Resinous Binder. H. C. Guhl, Wilkinsburg, assignor to Westinghouse Electric & Mfg. Co., East Pittsburgh, both in Pa.

2,315,701. Girdle or the Like Including a Flexible Body Portion of Sufficient Length to Extend at Its Bottom below the Crotch and at Its Top above the Hip Joints. H. M. Herbener, Thomasville, Ga.

2,315,758. Diaphragm Membrane of Vulcanized Latex Rubber Substantially Free from Reclaimed Rubber and Filler or Other Adulterant, Having a Thickened Rubber Center Nub. L. F. Willits, Atlantic City, N. J., assignor, by mesne assignments, to E. K. Tryon Corp.

2,315,975. Foundation Garment Including a Brassiere Having a Front Wall with Top and Bottom Sections. L. Malmstead, New York, N. Y.

2,315,996. Fluid Applicator Having a Discharge Spout with a Sponge Rubber Brush Point Mounted thereon. M. F. Workman, San Diego, Calif.

2,316,095. Syringe Including a Piston Having Rubber Washers. J. M. Mead, Jr., Scottsbluff, Nebr.

2,316,101. Waterproof Protective Garment Having an Upper Section and a Lower Section, the Opposed Edges of Which Are Arranged to be United to Provide a Waterproof Covering for the Wearer. J. Norred, Chicago, Ill.

2,316,293. Electric Power Cable Including an Electric Conductor and a Layer of Metal to Which Rubber Will Vulcanize, Surrounding the Conductor. T. R. Scott, London, England, assignor to International Standard Electric Corp., New York, N. Y.

2,316,333. Portable Apparatus Designed for the Thermal Vapor Treatment of Congestions in Parts of the Human Body, Having a Long Flexible Rubber Tube Connected to the Upper End of an Angular Metal Tube, and a Soft Rubber Applicator of Conical Shape Attached in a Vaporproof Joint to the Outer End of the Long Flexible Rubber Tube. W. E. Hillebrand, assignor to Vapo-Therm Process Co., both of Louisville, Ky.

2,316,461. Means for Moving a Circuit Closing Contact in Consequence of Variations in Air Pressure, Including a Flexible Rubber Cap. E. F. Schubert, Keenesburg, Colo.

2,316,549. Static Reducing Pneumatic Tire Including a Tire Casing, an Inner Tube Assembled within the Casing, and a Coating of an Electrically Conducting Acetylene Carbon Black Powder Adhered to the Surface Only of the Inner Wall of the Inner Tube around the Circumferential Crown Region thereof. G. L. Benson, Detroit, Mich., assignor to United States Rubber Co., New York, N. Y.

2,316,608. Centrifugal Fan Including a Resilient Mounting Having Rings of Rubber-Like Material. K. D. McMahan, Schenectady, N. Y., assignor to General Electric Co., a corporation of N. Y.

2,316,718. Tire Chain Device Having Coupling Members Formed of Round, Live Rubber Stock. W. R. Royer, Wilkes-Barre, Pa.

Dominion of Canada

411,073. Elastic Binding and Reenforcing Tape for Binding the Raw Edge of a Shoe Upper, Having a Narrow Fabric with Two Integrally Joined Extending Portions, Each Containing Longitudinally Extending Rubber Warp Strands. R. T. Dawes, Hudson, Mass., U. S. A.

411,118. Valve Stem for Pneumatic Tubes and the Like, Composed Entirely of Vulcanized Rubber Compounds and Including Stem and Base Portions. Dominion Rubber Co., Ltd., Montreal, P. Q., assignee of C. E. Maynard, Northampton, Mass., U. S. A.

411,143. Weatherstrip Including an Elongated, Cylindrical Body Formed of Sponge Rubber and a Flat Tape Formed of at Least Three Braided Metal Wires Crossing over and under Each Other Diagonally Back and Forth across the Tape. National Standard Co., assignee of C. C. Harrah, both of Niles, Mich., U. S. A.

411,210. Apparatus for Defibering and Deinking Waste Paper, Including a Pair of Corrugated Rubber Rollers and a Plurality of Stationary Spring Controlled Reciprocating Corrugated Rubber Pads. E. T. McGregor, Vancouver, B. C.

411,273. Resilient Cushioning Material Having Rough Surfaced, Soft, Elastically Compressible and Expansible Crumb-Like Particles of Sponge Rubber Incorporated Therein. Dominion Rubber Co., Ltd., Montreal, P. Q., assignee of M. M. Cunningham, South Bend, Ind., U. S. A.

411,418. A Flat Weatherstrip Including a Plurality of Resilient Wire Strands Braided Together, and a Rubber-Like Material Secured Thereto. Bridgeport Fabrics, Inc., assignee of L. Spraragen, both of Bridgeport, Conn.

411,545. Press Platen Containing a Multiplicity of Vulcanized Rubber Slabs Assembled Compactly Together in Face-to-Face Relation. Wingfoot Corp., Wilmington, Del., assignee of R. H. Waters, Akron, O., both in the U. S. A.

411,652. Pneumatic Tire Having a Tread Including One or More Circumferential Ribs or Projections Provided with Circumferentially Spaced Pairs of Slits Extending Inwardly at an Angle to the Ground-Engaging Surface of the Tire. Seiberling Rubber Co. of Canada, Ltd., Toronto, Ont., assignee of Seiberling Rubber Co., Barberton, assignee of F. Kovacs, Akron, both in O., U. S. A.

411,657. Inflated Athletic Game Ball of Substantially Ellipsoidal Form Having a Hollow Carcass with Rubber Members at Its End and Impregnated with Cement of Rubber or the Like. A. G. Spalding & Bros., Inc., Chicopee, assignee of M. B. Reach, Springfield, both in Mass., U. S. A.

United Kingdom

551,164. Vapor-Proof Storage and Shipping Cartons or Containers. Dewey & Almy, Ltd.

551,404. Adhesives and Coating Compositions. W. C. Dearing.

551,454. Fire Hose. G. Angus & Co., Ltd., D. E. F. Canney, and M. Balkin.

551,528. Deformable Diaphragms for Pumps and the Like. N. Swindin and Nordac, Ltd.

551,579. Material of Rubber or the Like. M. F. Swain.

PROCESS

United States

2,313,792. Making a Hollow Rubber Article Having a Communicating Tube Extending Therefrom, by Producing a Tube Assembly of Rubber Material and Depositing Rubber Material from a Liquid Rubber Composition to Produce a Hollow Body in Part in Contiguous Relation with the Flaring Reenforcing Element to Associate the Tube Assembly with the Hollow Body. G. L. Winder, Cuyahoga Falls, assignor to American Anode, Inc., Akron, both in O.

2,314,053. Manufacturing Storage Battery Separators by Detaching the Rubberized Strip of Canvas Formed of Superposed Layers from the Pure Rubber Tread of a Used Tire. R. A. Rothermel, London, England.

2,314,164. Making a Vulcanized Raincoat or the Like by Assembling the Raincoat of Unvulcanized, Vulcanizable Material, Applying to a Form, Suspending the Form with the Raincoat therecn in a Vulcanizer, and Vulcanizing the Raincoat. N. S. Sarkisian, assignor to Mishawaka Rubber & Woolen Mfg. Co., both of Mishakawa, Ind.

2,314,262. Making a Distensible Bag Catheter or Similar Article by Producing a Tubular Rubber Structure Having at Least Two Independent and Substantially Parallel Passageways, One of Which Opens through the Tubular Wall at a Point between the Ends Thereof. G. L. Winder, Cuyahoga, Falls, assignor to American Anode Inc., Akron, both in O.

2,314,964. Manufacturing Playing Balls by Filling a Collapsible Container with a Fluid Capable of Being Solidified by Freezing, Freezing the Filled Container, Providing a Solid Winding Pellet, Winding Rubber Strands under Substantial Tension upon the Pellet to Rupture the Container, thus Providing a Layer of Wound Strands of Substantial Thickness. L. A. Young, Detroit, assignor to L. A. Young Co., Grand Rapids, both in Mich.

2,315,366. Process to Convert Side-by-Side Simultaneously Extruded Separate Charges of Sponge Rubber Compound into Articles of Vulcanized Sponge Rubber. F. M. Daley, Shelton, and L. H. De Wyk, Ansonia, both in Conn., assignors to Sponge Rubber Products Co., Shelton, Conn.

2,315,576. Forming a Finished Seam in Hollow Rubber Articles Having Open Seam Edges, by Dipping the Open Seam Edges into Rubber Solution While Holding the Edges Sufficiently Distended to Permit Flow of Rubber Solution into and around the Seam. J. M. Auzin, Warwick, R. I., assignor to Davol Rubber Co., a corporation of R. I.

2,316,149. Process of Applying an Insignia to a Cable or the Like Having a Coating of Vulcanizable Material, Which Includes Pressing against the Cable in the Uncured State a Carrier Strip with a Pigmented Coating of Material Adapted to Be United to the Coating by Vulcanizing and Then Heating the Parts While in Contact under Pressure until the Coating Adheres and Becomes Integral with the Cable. H. O. Bates, Cranford, N. J.

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Dominion of Canada

411,165. **Making Elastic Yarn by Winding a Twisted Rubber Thread and Textile Yarn upon a Spool under Controlled Tension, then Withdrawing the Thread and Yarn Endwise from the Spool While It Is Rotated in an Opposite Direction to the Twist of the Thread.** United States Rubber Co., New York, N. Y., assignee of F. D. Chittenden, Rumford, R. I., both in the U. S. A.

411,166. **Making a Balanced Single-Cover Elastic Yarn by Delivering a Pre-Twisted Rubber Thread and a Covering Yarn along Separate Paths and at Independently Controlled Speeds.** United States Rubber Co., New York, N. Y., U. S. A., assignee of A. Côté, Outremont, P. Q., Canada.

411,227. **Dyeing Polyvinyl Halide-Acetate Copolymer by Subjecting the Material to the Action of a Dye Bath.** American Cyanamid Co., New York, N. Y., assignee of R. H. Kienle, Bound Brook, N. J., and F. E. Petke, Cincinnati, O., co-inventors, all in the U. S. A.

411,228. **Dyeing Mixed Materials Containing Substantially Unshrunk Polyvinyl Halide-Acetate Copolymer Fibers Admixed with Other Fibers.** American Cyanamid Co., New York, N. Y., assignee of A. F. Klein, Philadelphia, Pa., both in the U. S. A.

411,229. **Dyeing Polyvinyl Halide-Acetate Copolymer Containing Material with Dyestuffs Which Form Reduced Leuco Compounds.** American Cyanamid Co., New York, N. Y., assignee of F. E. Petke, Cincinnati, O., and A. F. Klein, Philadelphia, Pa., co-inventors, all in the U. S. A.

411,544. **Producing a Tire Vulcanizing Mold by Forming a Plaster Model of the Tire Ultimately to Be Vulcanized.** Wingfoot Corp., Wilmington, Del., assignee of A. C. Gunsaulus, Akron, and M. Bean, Yellow Springs, both in O., all in the U. S. A.

411,628. **In the Manufacture of Pneumatic Tires, a Method for Use in Casemaking.** Dunlop Tire & Rubber Goods Co., Ltd., Toronto, Ont., assignee of H. Willshaw and H. Taylor, co-inventors, both of Birmingham, Warwick, England.

United Kingdom

551,126. **Testing Synthetic-Resin-Coated Bands or Sheets.** M. J. Cradick and Metropolitan-Vickers Electrical Co., Ltd.

551,366. **Dipped Rubber Articles.** G. Ingram.

551,371. **Adhesive Coated or Impregnated Materials.** E. S. Hole.

551,410. **Vulcanization of Rubber.** Wingfoot Corp.

551,461. **Treatment of Rubber and Particularly Rubber Waste Materials.** A. Treves.

551,499. **Corrugated Rubber Tubing.** P. B. Cow & Co., Ltd., and W. A. Huizinga.

MACHINERY

United States

2,311,617. **Apparatus and Method for Making Thick Latex Rubber Sheeting.** M. E. Hansen, Silver Lake, assignor to American Anode Inc., Akron, both of O.

2,314,123. **Clamp Having a Sheet of Resiliently Flexible Material with a Transversely Bowed Portion Midway between Its Ends.** D. A. Brennan, deceased, late of Chicago, Ill., by E. L. Zwickel, executor, Chicago, Ill., assignor to Acco Products, Inc., Long Island City, N. Y.

2,314,127. **Tire Tool for Removing Pneumatic Casings from Rims, Having Radially Disposed Flanges against Which the Beads of a Casing Are Adapted to Fit.** G. F. Colley and N. S. Poindexter, both of Winston-Salem, N. C.

2,314,168. **Strand Wiping Die of Elastically Deformable Material Having a Bore therethrough and Formed with a Recess Having a Free Surface Running in the Same General Direction as the Bore.** C. C. Smith, Cranford, N. J., assignor to Western Electric Co., Inc., New York, N. Y.

2,314,176. **Apparatus to Make Porous or Spongy Articles of Rubber or Rubber-Like Material, from a Froth of Such Materials, Including a Container Impermeable to the Froth.** J. A. Talalay, Boston, Mass.

2,314,726. **Apparatus for Treating Tires Having a Tread Configuration Including Grooves, the Combination of a Support for Rotatably Positioning a Tire on a Vertical Axis, and Means for Centering and Clamping the Tire on the Support.** O. B. Moore and G. G. Havens, both of Detroit, and G. F. Wikle, Grosse Pointe, both in Mich., assignors to United States Rubber Co., New York, N. Y.

2,315,065. **Mounting for Resiliently Securing a Generator to the Axle Housing of a Railway Vehicle, the Housing Having Projections to Form Cubical Pockets Containing Rubber Balls Disposed under Some Initial Compression.** J. W. Livingston, Forest Hills, assignor to Union Switch & Signal Co., Swissvale, both in Pa.

2,315,283. **Apparatus for Manufacturing Thin Rubber Articles, Including Elastic Bags, by the Dipping Process.** R. E. Thompson, Nyack, N. Y., assignor to Lorica Laboratories, Inc., Jersey City, N. J.

2,315,770. **Vulcanizing Machine for Selectively Retreading or Recapping Tires, Including a Recapping Matrix Adapted to Extend across and Engage Only the Tread Portion of the Tire Lying between the Shoulders of the Tire to Cure a Recapped Portion Only of the Tire.** A. B. Cleveland, Los Angeles, Calif.

2,315,934. **Vulcanizer Containing a Relatively Fixed Lower Platen and a Relatively Movable Upper Platen in Spaced Superposed Relation thereto, the Platens Each Being Correspondingly Fabricated from Sectional Beams Having Welded Connecting Joints.** P. O. Chambers, assignor to Safety Vulcanizer Co., both of Chicago, Ill.

2,315,993. **Percussion Tool Including Resilient Means Providing a Stop and a Buffer Selected from the Group Comprising Polymerized Butadiene and Its Homologs and Substitution Products or Copolymers thereof with Unsaturated Compounds at the Opposite End of a Tubular Member.** C. S. Weyandt and E. J. Missien, assignors to Syntron Co., all of Homer City, Pa.

2,316,023. **Tire Removing Device Including an Oblong Wedge-Shaped Plate Capable of Being Inserted between the Outer Sidewall of the Tire and the Inner Edge of the Rim of the Wheel That Carries the Tire.** H. J. Sauer, Oakland, Calif.

2,316,352. **Vulcanizing Press Including a Plurality of Members Relatively Movable into Registry with Each Other and Having Recesses therein to Form a Closed Chamber.** R. G. Minns and H. T. Tornberg, assignors to National Rubber Machinery Co., all of Akron, O.

2,316,369. **Tire Building Apparatus Including a Rotatable Tire Building Drum, Tool Support, and a Shiftable Member Mounted on the Support.** F. J. Shook, assignor to National Rubber Machinery Co., both of Akron, O.

Dominion of Canada

411,117. **Appartus to Manipulate Rubber Stock Including Means for Supplying a Moving Layer of Relatively Hot Rubber Composition in Sheet Form, Means for Coating One Side of the Moving Layer with a Lubricating Material, for Cooling the Layer of Rubber Composition While so Moving, and Means for Cutting the Moving Layer into Slabs and for Stacking the Slabs in Superimposed Relation.** Dominion Rubber Co., Ltd., Montreal, P. Q., assignee of G. F. Wikle, Ann Arbor, Mich., U. S. A.

411,467. **Tire Bead Wrapper Having Means for Supporting a Tire Bead, Including a Plurality of Rollers.** Dominion Rubber Co., Ltd., Montreal, P. Q., assignee of C. H. Desautels, Springfield, Mass., U. S. A.

411,677. **Tire Tool Having a Clamp Spreader Including a Back Rib and End Jaws Turned to One Side thereof in a Common Plane.** W. Buck, Woodruff, Utah, co-inventor with an assignee of L. F. Neville, Evanston, Wyo., both in the U. S. A.

CHEMICAL

United States

2,314,067. **Producing Resins of the Sulphur Dioxide-Olefin Type by Reacting Sulphur Dioxide and a Compound Selected from the Group Consisting of Olefins, Pentyne-1, Hexyne-1, Allyl Alcohol, Vinyl Acetate and Allyl Propionate in the Presence of a Diisobutylene Ozonide as a Catalyst.** M. W. Barnett and J. H. Brown, Jr., both of Port Sulphur, La., assignors to Freeport Sulphur Co., New York, N. Y.

2,314,443. **Preparation of a Polymer of a Compound of the Class Including Alpha-Chloroacrylic Acid and Esters thereof, by Destroying Any Autooxidation Products in the Monomer by Treating with an Inorganic Compound Containing an Element of Readily Changed Valence.** J. W. C. Crawford, Frodsham, and N. McLeish, Runcorn, both in England, assignors to Imperial Chemical Industries, Ltd., a corporation of Great Britain.

2,314,457. **Production of a Dimer by the Polymerization of a Normally Gaseous Monomeric Olefin.** B. E. Roetheli and M. E. Conn, both of Baton Rouge, La., assignors to Standard Oil Development Co., a corporation of Del.

2,314,458. **Process for the Conversion of Low Boiling Olefins into Higher Boiling Hydrocarbons of Predetermined Boiling Range.** E. E. Stahly and F. B. Johnson, Baton Rouge, La., assignors to Standard Oil Development Co., a corporation of Delaware.

2,314,466. **Inhibiting the Polymerization and Condensation of an Organic Compound Having the Vinyl Group.** H. L. Thwaites, Clark Township, N. J., assignor, by mesne assignments, to Jasco, Inc., a corporation of La.

2,314,820. **Impregnation of Paper by a Carrier Medium Selected from a Group Including a Condensation Derivative of Rubber Obtained by Treating Rubber in Solution with Chlorostannic acid.** S. C. Fairbanks, Passaic, assignor to Hamersley Mfg. Co., Garfield, both in N. J.

2,314,893. **Obtaining Resinous and Volatile By-Products from Oil of the Coffee Bean by Heating the Oil and Subjecting the Residue to Increased Temperature Long Enough to Effect Polymerization, at Least until a Tough Rubbery Resinous Compound Is Obtained, and Separating the Polymerized Product from the Volatile Constituents.** H. S. Polin, New York, A. I. Nerken, Brooklyn, and H. Wettingfeld, Jr., Bayside, L. I., all in N. Y., assignors to Coffee X Corp., a corporation of Delaware.

2,314,904. **Producing Benzene-Soluble Cyclic Diene Polymer by the Catalytic Polymerization of a Cyclic Diene Compound.** F. L. Soday, Upper Darby, Pa., assignor to United Gas Improvement Co., a corporation of Pa.

2,314,908-911. **Producing Benzene-Soluble Cyclic Diene Polymer by the Catalytic Polymerization of a Cyclic Diene Compound.** S. G. Trepp, Swarthmore, Pa., assignor to United Gas Improvement Co., a corporation of Pa.

2,314,996. **Treating Cotton Cord with a Heat-Hardening Resorcinol-Formaldehyde-Latex Adhesive.** E. T. Lessig and I. Gasdik, both of Akron, O., assignors to B. F. Goodrich Co., New York, N. Y.

2,314,997. **Improving the Adhesion of Cotton to Rubber by Coating the Cotton with an Aqueous Polyhydricphenol-Aldehyde-Latex Dispersion.** E. T. Lessig and H. P. Headley, both of Akron, O., assignors to B. F. Goodrich Co., New York, N. Y.

2,314,998. **Improving the Adhesion of a Member of the Class Including Natural and Synthetic Organic Fibers to Rubber.** E. T. Lessig and H. P. Headley, both of Akron, O., assignors to B. F. Goodrich Co., New York, N. Y.

2,315,037. **Preparing a Solid Thermoplastic Resin from a Resin Prepared by Polymerizing Propylene.** L. A. Bannon, Roselle, N. J., assignor, by mesne assignments, to Jasco, Inc., a corporation of La.

2,315,708. **Producing a Resinous Product from Soya Bean Oil, Pentaerythritol, and Phthalic Anhydride.** A. G. Hovey, Birmingham, and T. S. Hodgins and C. J. Meeske, both of Royal Oak, assignors to Reichhold Chemicals, Inc., Detroit, all in Mich.

2,315,771. **Process for Removal of Color-Forming Impurities from a Crude Resin Oil in Which the Polymerizable Constituents Consist Predominantly of Material Selected from the Group Consisting of Coumarone, Indene, and Homologs of Styrene.** E. L. Cline, Philadelphia, Pa., assignor, by mesne assignments, to Allied Chemical & Dye Corp., a corporation of New York.

2,315,849. **Mixing Rubber with a Relatively Large Amount of Carbon Black and a Poly-Amido Derivative of Carbonic Acid Containing at Least One Primary Amido Group.** R. H. Gerke, Nutley, N. J., assignor to United States Rubber Co., New York, N. Y.

2,315,850. **Mixing Rubber with a Relatively Large Amount of Carbon Black and a Small Amount of Hydrazine.** R. H. Gerke, Nutley, N. J., assignor to United States Rubber Co., New York, N. Y.

2,315,855. **Mixing Rubber with a Relatively Large Amount of a Rubber Reenforcing Black and an Aromatic Nitroso Compound Incapable of Exhibiting Tautomerism.** L. H. Howland, Cheshire, Conn., assignor to United States Rubber Co., New York, N. Y.

2,315,856. **Mixing Rubber with a Relatively Large Amount of Carbon Black and a Small Amount of a Para-Quinone Oxime Compound Including the Group—O—N=A. Where A Is Any Quinonoid Nucleus.** L. H. Howland, Cheshire, Conn., assignor to United States Rubber Co., New York, N. Y.

2,315,857. **Mixing Rubber with a Relatively Large Amount of Carbon Black and a Small Amount of a Di(primary) Amine.** L. H. Howland, Cheshire, Conn., assignor to United States Rubber Co., New York, N. Y.

2,316,196. **Composition Including a Polymer in Which the Predominant Constituent Is Vinyl Chloride, a Chlorinated Aromatic Hydrocarbon Solvent, and Maleic Anhydride.** H. Tucker, Cuyahoga Falls, O., assignor to B. F. Goodrich Co., New York, N. Y.

2,316,380. **Polymerizing Olefins by Treatment with Sulphuric Acid.** P. Woog, Paris, France; vested in the Alien Property Custodian.

2,316,536. **Polymerizing Acetylene to Non-Benzenoid Polymers.** O. Fuchs, Frankfort-on-the-Main-Hochst, Germany; vested in the Alien Property Custodian.

2,316,598. **Method of Polymerizing 2-Chloro-Butadiene-1,3, Which Includes Partially Polymerizing the Latter Compound in the Presence of an Inert Atmosphere to Form a Foundation Polymer at a Relatively Low Reaction Rate.** R. Kitani, N. Takashima, and H. Kaneko, all of Kawasaki, Japan, assignors to General Electric Co., New York, N. Y.

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411,434. **Coating Composition Comprising the Reaction Product at Room Temperatures of a Blown Oil Having Drying Properties and from 1% to 3% Phosphoric Acid, a Resin, and Solvents, the Reaction Product Having Been Dispersed in Solvents before a Rubbery Gel Is Produced, the Solids of the Composition Being Below about 50%.** Canadian Industries, Ltd., Montreal, P. Q., assignee of L. Balassa, Flint, Mich., U. S. A.

411,541. **Preparing Copolymers of Vinyl Chloride and Vinylidene Chloride by Polymerizing a Mixture of Them in an Aqueous Emulsion.** Wingfoot Corp., Wilmington, Del., assignee of W. Scott, Akron, O., and R. S. Seymour, Allentown, Pa., all in the U. S. A.

411,653. **Producing Olefin Polymers by Maintaining a Hydrocarbon Mixture of Different Olefins of at Least Three Carbon Atoms.** Shell Development Co., San Francisco, assignee of S. H. McAllister, Lafayette, both in Calif., U. S. A.

United Kingdom

551,512. **Polymerization of Olefins and Preparation of Catalysts therefor.** A. Wassermann.

551,521. **Methyl Vinyl Ketone.** Wingfoot Corp.

UNCLASSIFIED

United States

2,313,945. **New Composition of Matter Including a Rubbery Substance Characterized by High Elongation under Load.** H. B. Kellog, Union City, and I. E. Lightbown, Elizabeth, both in N. J., assignors, by mesne assignments, to Jasco, Inc., a corporation of La.

2,314,965. **Apparatus to Signal the Reduction of Pressure of Pneumatic Tires Including a Device Having a Sliding Stem, Which Is Controlled by the Pressure of the Tire.** E. Alava y Sautu, Vitoria, Spain.

2,316,169. **Heat and Light-Stable Composition Including a Polymer in Which the Predominant Constituent Is Vinyl Chloride and a Partial Ester of a Polyhydric Alcohol.** A. B. Japs, Cuyahoga Falls, O., assignor to B. F. Goodrich Co., New York, N. Y.

2,316,323. **Vinyl Resin Composition Which Includes a Vinyl Resin Resulting from the Conjoint Polymerization of a Vinyl Halide with a Vinyl Ester of an Aliphatic Acid.** A. K. Doolittle, South Charleston, W. Va., assignor to Carbide & Carbon Chemicals Corp., a corporation of N. Y.

2,316,502. **Demountable Rim for Pneumatic Tires Including a Hollow Cylindrical Rim Having Inner Opposed Segmental Thread Elements Arranged Adjacent to Each Other.** J. W. Carman, Seattle, Wash.

2,316,706. **Plastic Compositions Including a Solid Polyisobutylene Incapable of Being Rolled to Smooth Thin Foils at Temperatures below about 160° C.** M. Mueller-Cunradi and W. Daniel, both of Ludwigshafen-on-the-Rhine, Germany; assignors to Jasco, Inc., a corporation of La.

Dominion of Canada

411,223. **Coloring Composition to Color Materials Including a Colored Aqueous Dispersion of a Water Insoluble Synthetic Resinous Composition Capable of Curing by Heat or Oxidation and Having Incorporated Therein an Organic Solvent.** American Cyanamid Co., New York, N. Y., assignee of A. L. Peiker, East Bound Brook, N. J., both in the U. S. A.

411,232. **Milk Bottle Cap Including a Skirt Portion Having a Coating of Synthetic Resin, Selected from the Class Including Polyvinyl Acetate, Polyvinyl Chloride, the Copolymer of Vinyl Acetate and Vinyl Chloride, Vinylidene Resins and Their Copolymers, Modified Glyceryl Phthalates, and Acrylate Resins.** American Seal-Kap Corp. of Delaware, Wilmington, Del., assignee of K. Clark, New York, and H. G. Vore, Forest Hills, L. I., co-inventors, both in N. Y., both in the U. S. A.

411,256. **Coating Composition for Fibrous Materials Including a Vinyl Resin Substantially Identical with a Resin Resulting from the Conjoint Polymerization of Vinyl Chloride with Vinyl Acetate.** Carbide & Carbon Chemicals, Ltd., Toronto, Ont., assignee of A. K. Doolittle, South Charleston, W. Va., U. S. A.

411,324. **Tennis Ball Comprising a Body, a Cover on the Body Consisting of a Layer of Leather Having Its Flesh Side toward the Outside, and a Layer of Adhesive Material Intermediate the Body and the Cover.** A. G. Spalding & Bros. of Canada, Ltd., Brantford, Ont., assignee of W. F. Reach, Springfield, Mass., U. S. A.

411,337. **Insulated Submarine Cable Conductor Including a Viscous or Semi-Liquid Substance Containing Polymerized Mono-Olefin Hydrocarbons.** Western Electric Co., Inc., New York, N. Y., assignee of A. R. Kemp, Westwood, and F. S. Malm, Millburn, co-inventors, both in N. J., both in the U. S. A.

TRADE MARKS

United States

400,502. **Philco.** Cement. Philco Corp., Philadelphia, Pa.

400,515. **Telcovin.** Gutta percha, India rubber, balata, and synthetic rubber. Telegraph Construction & Maintenance Co., Ltd., London, England.

400,555. **Cycle-Weld.** Cement. Chrysler Corp., Highland Park, Mich.

400,607. Representation of a black label with the words: **"Miss Vivi."** Corsets, brassieres, and garter belts. Vivette Foundations, Inc., New York, N. Y.

400,611. **Cataract Super Bond.** Cement and cement thinner for shoes. Cataract Chemical Co., Inc., Buffalo, N. Y.

400,622. **Hy-Mac.** Hydraulic power transmission circuits used in hydraulically operated machines including rubber molding machines. Hydraulic Machinery, Inc., Detroit, Mich.

400,660. **Rovcelite.** Synthetic resin. Royce Chemical Co., Carlton Hill, N. J.

400,662. **Anticipation.** Foundation garments. Lewel Mfg. Co., Inc., New York, N. Y.

400,671. **Ubatex.** Cement. Union Bay State Co., Inc., Cambridge, Mass.

400,725. Representation of a banner containing the word: **"Rubbertex"** and above it the words: **"Securely yours."** Cement. Morenci Allied Products, Morenci, Mich.

400,752. **Robutine.** Coated fabrics. Robutine Products Corp., New York, N. Y.

400,762. **Koloc.** Reclaimed rubber compositions used in depositing minute rubber particles in fabrics. United States Rubber Co., New York, N. Y.

400,763. **Koloc.** Latex compositions used in depositing minute rubber particles in fabrics. United States Rubber Co., New York, N. Y.

400,771. **Nylo-Flight.** Airplane tires. Goodyear Tire & Rubber Co., Akron, O.

400,774. **Crescent.** Tires and tubes. Pharis Tire & Rubber Co., Newark, O.

400,988. **Freighter.** Tires and tubes. Firestone Tire & Rubber Co., Akron, O.

OBITUARY

William S. Gordon

NEWS comes from London of the death there on April 11, of William Stuart Gordon, pioneer in the crude rubber trade in Brazil and for many years associated with the General Rubber Co. Mr. Gordon was born at Elgin, Scotland, in 1870 and was educated in English schools. Forming the firm of Gordon & Co., at Manaos, Brazil, in the late Nineties, he was among the first to engage in the exclusive shipment of crude rubber to American manufacturers. In 1904 the General Rubber Co. purchased Gordon & Co. and U. S. Mendes Co. of Para, and Mr. Gordon managed the two houses until 1911 when they were merged as the General Rubber Co. of Brazil. He was also manager of the Associacao Commercial do Amazonas during this period. Mr. Gordon remained as vice president and general manager until 1916 when he took charge of the Singapore branch. In 1917 he came to New York as acting general manager for the duration of World War I. In 1918 he returned to London as vice president of the General Rubber Co., where he remained until 1927. At this time he retired from his more active duties, remaining in the advisory capacity as a director.

Later on Mr. Gordon became associated with the Waverley Rubber Co., Edinburgh, manufacturer of footwear, serving as a director for a number of years.

He is survived by his wife.

Charles A. Schranz

CHARLES A. SCHRANZ, 68, manager of the machinery department, R. D. Wood Co., Philadelphia, Pa., for 25 years, died at his home in Wynnewood, March 22 after a short illness. Mr. Schranz joined the company in 1905 as an engineer, specializing in the design of gas holders, gas producers, pumping equipment, and hydraulic machinery. He was also a director of the Florence Pipe Foundry & Machine Co., Philadelphia, and a member of the American Society of Mechanical Engineers.

Surviving are his wife, a sister and a brother.

Walter W. Plechner

WORD recently was received of the death in action in North Africa on March 4 of Lieut. Col. Walter W. Plechner, assistant director of research for the Titanium Division of the National Lead Co., 111 Broadway, New York, N. Y. Born in Philadelphia, Pa., 40 years ago, Colonel Plechner attended the College of the City of New York and was a member of its chemistry department from 1925 to 1929. After he received his Ph.D. in chemical engineering from Columbia University, he became a research chemist for Titanium Pigment Co., Inc., where he remained until 1934. He next served as director of research for the Southern Mineral Products Corp., but later returned to the Titanium organization. Taking a leave on December 20, 1940, he was called to duty as a captain with the staff of the First Infantry Division.

He leaves a wife and a ten-year-old son.

Scrap Rubber Ceilings

Inner Tubes†	¢ per Lb.
No. 2 passenger tubes	7¾
Red passenger tubes	7½
Passenger tubes	6

Tires‡	$ per Short Ton
Mixed passenger tires	18.00
Beadless passenger tires	24.00
Solid tires	34.00

Peelings†	
No. 1 peelings	47.50
No. 2 peelings	47.50
No. 1 light colored (zinc) carcass	52.50

Miscellaneous Items‡	
Air brake hose	25.00
Miscellaneous hose	17.00
Rubber boots and shoes	33.00
Black mechanical scrap above 1.15 sp. gr.	20.00
General household and industrial scrap	15.00

† All consuming centers except Los Angeles.
‡ Akron only.
‡ All consuming centers.

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War has brought to the rubber industry challenges that call for American ingenuity and steadfast purpose. We are proud today to be a part of this industry; wartime has revealed its stamina.

We're in it together. We'll win it together!

DAVOL RUBBER COMPANY
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TIRE BUILDING DRUMS AND MOLDS
for all sizes and types of tires

BAND BUILDERS
with squeegee applicators

MECHANICAL PRESSES
200 - 400 - 750 ton sizes

TIRE PRESSES
45" - 55" - 65"
singles and duals

The Akron Standard Mold Co.

Akron — "The Established Measure of Value" — Ohio

Market Reviews

COMPOUNDING INGREDIENTS

THE industrial chemical market reflects a mixed tone. Demands for synthetic rubber and some other vital materials are taking a substantial tonnage. If the latter trend continues, it may prove sufficient to offset the recent slack in other fields.

CARBON BLACKS. Shipments are still showing the improvement noted since the outset of this year, attributed chiefly to the growing activity arising from the increased tempo of the synthetic rubber production program. Buying of gas blacks is attaining larger proportions commensurate with the enlarged manufacturing operations in rubber products.

The demand for Gastex and other furnace-type blacks far exceeds the supply. All of these materials have been under allocation orders since November 1, and at present the government is allocating from 60% to 70% of the monthly requirements of customers. Several new furnace-type plants will be put into operation in the near future, but as more synthetic rubber is produced, it is felt that the situation will not improve greatly for another six months.

FINISHES. Dry-ground mica processors continue slow in availing themselves of OPA's recent authorization of a $5 per ton advance in prices of their grades, but are rapidly making the upward revisions of their own quotations.

PIGMENTS. Buying interest in litharge is diminishing seasonally; and buying of white lead for war production account is still sizable although purchasing on civilian scores is diminishing further.

PLASTICIZERS. OPA has revised provisions governing sales of imported ADF cresylic acid and established a procedure to control prices in the event a government agency becomes the sole importer. The new provisions were accomplished through a revision of MPR 192.

SOFTENERS. Cycline Oil has been discontinued because of the WPB restriction on one of the ingredients, and S-Oil has replaced it at the same price.

VEGETABLE OILS. Month by month the vegetable oil situation is tightening up. Because of allocations, delays in transportation, and a general supply shortage, users of rubber substitute or factice vulcanized vegetable oils must look a month or two in advance of needs to be sure to obtain supplies in time to fill their needs. The demand continues heavy.

Current Quotations*

Abrasives

Pumicestone, powdered	lb.	$0.035	/$0.04
Rottenstone, domestic	lb.	.025	

Accelerators, Inorganic

Lime, hydrated, *l.c.l.*, New York	ton	25.00	
Litharge (commercial)	lb.	.09	
Magnesia, calcined, heavy	lb.		
technical, light	lb.	.0625/	.07

Accelerators, Organic

A-1	lb.	$0.28	/$0.33
A-10	lb.	.36	/ .42
A-19	lb.	.52	/ .65
A-32	lb.	.60	/ .70
A-46	lb.	.50	/ .57
A-77	lb.	.42	/ .55
A-100	lb.	.42	/ .55
Accelerator 49	lb.	.41	/ .42
808	lb.	.59	/ .61
833	lb.	1.13	/ 1.15
Acrin	lb.	.65	
Advan	lb.	.52	/ .55
Aldehyde ammonia	lb.	.65	/ .70
Altax	lb.	.43	/ .45
Arazate	lb.	1.53	
B-J-F	lb.	.38	/ .43
Beutene	lb.	.59	/ .64
Butasan	lb.	1.13	
Butazate	lb.	1.13	
Butyl Eight	lb.	.97	/ .99
C-P-B	lb.	1.95	
Captax	lb.	.38	/ .40
D-B-A	lb.	1.95	
Delac A	lb.	.39	/ .48
O	lb.	.39	/ .48
P	lb.	.39	/ .48
Di-Esterex-N	lb.	.50	/ .57
DOTG (Di-orthotoly-guanidine)	lb.	.44	/ .46
DPG (Diphenylguanidine)	lb.	.35	/ .36
El-Sixty	lb.	.40	/ .47
Ethasan	lb.	1.13	
Ethazate	lb.	1.13	
Ethylideneaniline	lb.	.42	/ .43
Formaldehyde P.A.C.	lb.	.06	/ .0625
Formaldehyde-para-toluidine	lb.	.63	/ .65
Formaniline	lb.	.36	/ .37
Guantal	lb.	.39	/ .48
Hepteen	lb.	.34	/ .39
Base	lb.	1.25	/ 1.40
Hexamethylenetetramine U.S.P.	lb.	.39	
Technical	lb.	.33	
Lead oleate, No. 999	lb.	.135	
Witco	lb.	.15	
Ledate	lb.	1.48	
M-B-T	lb.	.38	/ .40
M-B-T-S	lb.	.43	/ .45
Methasan	lb.	1.23	
Methazate	lb.	1.23	
Monex	lb.	1.53	
Morfex "33"	lb.	.67	/ .72
"55"	lb.	.96	/ 1.01
O-X-A-F	lb.	.38	/ .43
Oxynone	lb.	.77	/ .90
Para-nitroso-dimethylaniline	lb.	.85	
Pentex	lb.	.74	/ .84
Flour	lb.	.1225/	.1325
O	lb.		
Flour	lb.		
Phenex	lb.	.49	/ .54
Pipazate	lb.	1.53	
Pip-Pip	lb.	1.63	
R & H 50-D	lb.	.42	/ .45
Rotax	lb.	.48	/ .50
Safex	lb.	1.15	/ 1.25
Santocure	lb.	.60	/ .67
Selenac	lb.	1.98	
SPDX	lb.	.69	/ .74
A	lb.	.69	/ .74
Super sulphur No. 2	lb.	.13	/ .15
Tetrone A	lb.	2.20	
Thiocarbanilide	lb.	.28	/ .33
Thiofide	lb.	.43	/ .50
Thionex	lb.	1.53	
Thiotax	lb.	.38	/ .45
Thiurad	lb.	1.53	
Thiuram E	lb.	1.53	
M	lb.	1.53	
Trimene	lb.	.54	/ .64
Base	lb.	1.03	/ 1.18
Triphenylguanidine (TPG)	lb.	.45	
Tuads, Methyl	lb.	1.53	
Tuex	ton	1.53	
2-MT	lb.	0.58	/ 0.60
Ulto	lb.	.99	/ 1.04
Ureka	lb.	.50	/ .57
Blend B	lb.	.50	/ .57
C	lb.	.48	/ .55
Vulcanex	lb.	.42	/ .43
Z-B-X	lb.	2.45	
Zenite	lb.	.40	/ .42
A	lb.	.45	/ .47
B	lb.	.42	/ .44
Zimate, Butyl	lb.	1.13	
Ethyl	lb.	1.13	
Methyl	lb.	1.23	
Zipacel	lb.	1.65	

*Prices in general are f.o.b. works. Range indicates grade or quantity variations. Space limitation prevents listing of all known ingredients. Prices are not guaranteed, and those readers interested should contact suppliers for spot prices.

Activators

Aero Ac 50	lb.	$0.46	/$0.52
Barak	lb.	.50	
MODX	lb.	.295 /	.345
SL-20	lb.	.1089/	.1135

Age Resisters

AgeRite Alba	lb.	1.95	/ 2.05
Gel	lb.	.52	/ .54
Hipar	lb.	.61	/ .63
Powder	lb.	.43	/ .45
Resin	lb.	.43	/ .45
D	lb.	.43	/ .45
White	lb.	1.23	/ 1.33
Akroflex C	lb.	.53	/ .65
Albasan	lb.	.69	/ .74
Aminox	lb.	.43	/ .52
Antox	lb.	.54	/ .56
Betanox	lb.	.43	/ .52
B-L-E	lb.	.43	/ .52
Powder	lb.	.61	/ .70
B-X-A	lb.	.43	/ .52
Copper Inhibitor X-872-A	lb.	1.15	
Flectol H	lb.	.43	/ .55
White	lb.	.89	/ 1.00
M-U-F	lb.	1.48	
Neozone (standard)	lb.	.61	/ .63
A	lb.	.43	/ .45
C	lb.	.43	/ .55
D	lb.	.43	/ .45
Distilled	lb.	.48	/ .50
E	lb.	.61	/ .63
Oxynone	lb.	.77	/ .90
Permalux	lb.	1.18	/ 1.20
Santoflex B	lb.	.43	/ .55
BX	lb.	.54	/ .64
Santovar A	lb.	1.15	/ 1.40
Stabilite	lb.	.48	/ .69
Alba	lb.	.50	/ .74
Thermoflex A	lb.	.61	/ .63
C	lb.	.54	/ .56
Tysonite	lb.	.165	/ .1675
V-G-B	lb.	.43	/ .52

Alkalies

Caustic soda, flake, Columbia (400-*lb. drums*)	100 lbs.	2.70	/ 3.55
Liquid, 50%	100 lbs.	1.95	
Solid (700-*lb. drums*)	100 lbs.	2.30	/ 3.15

Antiscorch Materials

Antiscorch T	lb.	.90	
Cumar RH	lb.	.105	
E-S-E-N	lb.	.34 /	.39
R-17 Resin (*drums*)	lb.	.1075	
RM	lb.	1.25	
Retarder W	lb.	.36	
Retardex	lb.	.445 /	.475
U-T-B	lb.	.34 /	.39

Antiseptics

Compound G-4	lb.	1.50	
G-11	lb.	4.50	

Antisun Materials

Heliozone	lb.	.23 /	.24
S.C.R.	lb.	.32 /	.34
Sunproof	lb.	.2275/	.2775
Jr.	lb.	.165 /	.215

Blowing Agents

Ammonium Carbonate, lumps (500-*lb. drums*)	lb.	.0825	
Unicel	lb.	.50	

Brake Lining Saturant

B.R.T. No. 3	lb.	.0175/	.0185

Colors

Black

Du Pont powder	lb.	.42	
Lampblack (commercial), *l.c.l.*	lb.	.15	

Blue

Du Pont Dispersed	lb.	.35 /	.95
Powders	lb.	2.25 /	3.75
Heliogen BKA	lb.		
Toners	lb.		

Brown

Mapico	lb.	.1135	

Green

Chrome	lb.	.25	
Oxide (*freight allowed*)	lb.	.24	
Du Pont Dispersed	lb.	.98 /	2.85
Powders	lb.	1.00	
Guignet's (*bbls.*)	lb.	.70	
Toners	lb.		

Orange

Du Pont Dispersed	lb.	.88/	2.35
Powders	lb.	2.75/	3.05
Toners	lb.		

Orchid

Toners	lb.		

Pink

Toners	lb.		

Purple

Toners	lb.		

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Easy to apply, water-repellent, non-flammable, Johnson's Wax Finishes are valuable allies for the manufacturer of rubber goods. They retard oxidation, the destroyer of rubber, and add a lustre which improves the appearance of the finished products.

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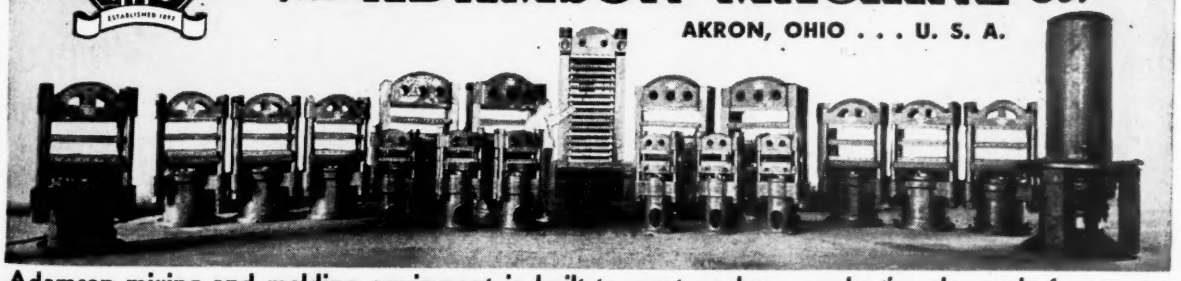

Adamson mixing and molding equipment is built to meet modern production demands for greater accuracy at lower costs. What's your machine problem? A card will bring full particulars. Write today!

Red

Antimony Crimson, 15/17%	lb.		
R.M.P. No. 3	lb.	$0 48	
Sulphur free	lb.		
R.M.P.	lb.	.52	
Golden 15/17%	lb.		
7-A	lb.	.37	
Z-2	lb.	.25	
Cadmium, light (400-lb. bbls.)	lb.	.85	/
Du Pont Dispersed	lb.	.93	/$2.05
Powders	lb.	.60	/ 1.65
Iron Oxide, l.c.l.	lb.	.075	/ .15
Mapico	lb.	.096	
Rub-Er-Red (bbls.)	lb.	.0975	
Toners	lb.		

White

Lithopone (bags)	lb.	.0425	/ .045
Albalith	lb.	.0425	/ .045
Astrolith (50-lb. bags)	lb.	.0425	/
Azolith	lb.	.0425	/ .045
Titanium Pigments			
Ray-Bar	lb.	.055	/ .065
Ray-Cal	lb.	.0525	/ .0625
Rayox	lb.	.135	/ .165
Titanolith (50-lb. bags)	lb.	.056	/
Titanox-A	lb.	.145	/ .175
B	lb.	.0575	/ .0625
30	lb.	.0575	/ .0625
C	lb.	.055	/ .06
RC	lb.	.055	/ .06
RC-HT	lb.	.055	/ .06
Ti-Tone	lb.		
Zopaque (50-lb. bags)	lb.	.145	/
Zinc Oxide			
Azo ZZZ-11	lb.	.0725	/ .075
44	lb.	.0725	/ .075
55	lb.	.0725	/ .075
66	lb.	.095	/ .0975
French Process, Florence			
Green Seal-8	lb.	.09	/ .0925
Red Seal-9	lb.	.085	/ .0875
White Seal-7	lb.	.095	/ .0975
Kadox, Black Label-15	lb.	.0725	/ .075
No. 25	lb.	.085	/ .0875
72	lb.	.0725	/ .075
Red Label-17	lb.	.0725	/ .075
Horse Head Special 3	lb.	.0725	/ .075
XX Red-4	lb.	.0725	/ .075
23	lb.	.0725	/ .075
72	lb.	.0725	/ .075
78	lb.	.0725	/ .075
80	lb.	.0725	/ .075
103	lb.	.0725	/ .075
110	lb.	.0725	/ .075
St. Joe (lead free)			
Black Label	lb.	.0725	/ .075
Green Label	lb.	.0725	/ .075
Red Label	lb.	.0725	/ .075
U.S.P.	lb.	.105	/ .1075
Zinc Sulphide Pigments			
Cryptone-BA-19	lb.	.056	/ .0585
BT	lb.	.056	/ .0585
CB	lb.	.056	/ .0585
MS	lb.	.0575	/ .06
ZS No. 20	lb.	.0825	/ .085
86	lb.	.0825	/ .085
230	lb.	.0825	/ .085
800	lb.	.0825	/ .085
Sunolith	lb.	.0425	/

Yellow

Cadmolith (cadmium yellow), (400-lb. bbls.)	lb.	.60	/
Du Pont Dispersed	lb.	1.25	/ 1.85
Powders	lb.	.70	/ 1.75
Mapico	lb.	.071	
Toners	lb.		

Dispersing Agents

Bardex	lb.	.0425	/ .045
Bardol	lb.	.025	/ .0275
B	lb.	.05	/ .0525
Darvan No. 1	lb.	.30	/ .34
2	lb.	.30	/ .34
3	lb.	.30	/ .34
Nevoll (drums, c.l.)	lb.	.02	/ .025
Santomerse S	lb.	.11	/ .25

Extenders

Advagum 1098	lb.	.42	/
1198	lb.	.35	/
Extendex C	lb.		
Naftolen	lb.	.15	/ .20
"600"	lb.	.14	/ .16
Vanzak	gal.	.05	/ .06

Fillers, Inert

Asbestine, c.l.	ton	20.00	
Asbestos Fiber	ton	15.50	/ 48.00
Barytes	ton	40.00	
f.o.b., St. Louis (50-lb. paper bags)	ton	25.55	
Off color, domestic	ton	29.00	
White, domestic	ton	38.50	
Blanc fixe, dry, precip	ton	80.00	
Calcene	ton	37.50	/ 43.00
Infusorial earth	lb.	.0225	
Kalite No. 1	ton	26.00	
3	ton	36.00	
Kalvan	ton	100.00	
Magnesium Carbonate, l.c.l.	lb.	.0625	/ .075
Paradene No. 2 (drums)	lb.	.0525	
Pyrax A	ton	7.50	
Whiting			
Columbia Filler	ton	9.00	/ 14.00
Suprex White	ton	32.50	
Witco, c.l.	ton	8.00	
Witcarb	lb.		

Finishes

Black-Out (surface protective)	gal.	$4.50	/$5.00
Mica, l.c.l.	ton	20.00	/90.00
Rubber lacquer, clear	gal.	1.00	/ 2.00
Colored	gal.	2.00	/ 3.50
Shoe varnish	gal.	1.45	
Talc	ton	25.00	

Flock

Cotton flock, dark	lb.	.095	/ .11
Dyed	lb.	.50	/ .80
White	lb.	.15	/ .19
Rayon flock, colored	lb.	1.00	/ 1.50
White	lb.	.90	/ 1.25

Latex Compounding Ingredients

Accelerator 552	lb.	1.63	
Aerosol OT Aqueous 25%	lb.		
Antox, dispersed	lb.	.54	
Aquarex D	lb.	.75	
F	lb.	.85	
MDL Paste	lb.	.25	
Areskap No. 50	lb.	.18	/ .24
100, dry	lb.	.39	/ .51
Aresket No. 240	lb.	.16	/ .22
300, dry	lb.	.42	/ .50
Aresklene No. 375	lb.	.35	/ .50
400, dry	lb.	.51	/ .65
Black No. 25, dispersed	lb.	.22	/ .40
Casein, muriatic 30-mesh	lb.		
Collocarb	lb.	.07	
Color Pastes, dispersed	lb.	.75	/ 1.10
Copper Inhibitor X-872	lb.	2.25	
Dispersex No. 15	lb.	.11	/ .12
No. 20	lb.	.08	/ .10
Factex Dispersion A	lb.	.185	
Heliozone, dispersed	lb.	.25	
MICRONEX, Colloidal	lb.	.06	
R-2 Crystals	lb.	1.55	
S-1 (400-lb. drums)	lb.	.65	
Santobrite Briquettes	lb.		
Powder	lb.		
Santomerse D	lb.	.41	/ .65
S	lb.	.11	/ .25
Sodium Stearate	lb.	.40	
Stablex A	lb.	.90	/ 1.10
B	lb.	.70	/ .95
C	lb.	.40	/ .50
Sulphur, dispersed	lb.	.10	/ .15
No. 2	lb.	.08	/ .12
T-1 (440-lb. drums)	lb.	.40	
Tepidone	lb.	.63	
Tetrone A	lb.	2.20	
Tysonite, dispersed	lb.	.32	/ .35
Zenite Special	lb.	.47	
Zinc oxide, dispersed	lb.	.12	/ .15

Mineral Rubber

Black Diamond, l.c.l.	ton	25.00	/30.00
B.R.C. No. 20	lb.	.0105	/ .0115
Hydrocarbon, Hard	lb.	25.00	/27.00
MilliMar	lb.	.055	
Parmr	ton		
Pioneer, c.l.	lb.	25.00	/30.00
285°-300°	ton	25.00	/27.00

Mold Lubricants

Aluminum Stearate	lb.	.23	/ .24
Aquarex D	lb.	.75	
MDL Paste	lb.	.25	
Colite	gal.	.90	/ 1.15
Lubrex	lb.	.25	/ .30
Mold Paste	lb.	.12	/ .30
Rubber-Glo, conc. regular	gal.	.94	/ 1.15
Type W	gal.	.99	/ 1.20
Sericite	ton	65.00	
Soapstone, l.c.l.	ton	25.00	/ 35.00
Zinc Stearate	lb.	.30	/ .31

Oil Resistant

A-X-F	lb.	.82	/ .85

Reclaiming Oils

B.R.V.	lb.	.035	/ .0375
C-10	gal.	.19	/ .24
D-4	gal.	.17	/ .22
E-5	gal.	.15	/ .20
No. 1621	lb.	.021	/ .0235
S.R.O.	lb.	.02	/ .0225
X-60 (reclaiming)	gal.	.20	/ .27
X-443	gal.	.29	

Reenforcers

Alumina, Hydrated			
Alorco C-740	lb.	.0375	/ .065
C-741	lb.	.0375	/ .065
Carbon Black			
Aerfloted Arrow Specification (bags only)	lb.	.0355†	
Arrow Compact Granulized	lb.	.0355†	
Certified Heavy Compressed (bags only)	lb.	.0355†	
SPHERON	lb.	.0355†	/ .07
Channel "S"	lb.	.12	
Continental, dustless	lb.	.0355†	
"AA"	lb.		
Compressed (bags only)	lb.	.0355†	
Disperso	lb.	.0355†	
Dixie	lb.	.0355†	
Dixiedensed	lb.	.0355†	
66	lb.	.0355†	
Furnex	lb.	$.035	
Beads	lb.	.035	
Gastex	lb.	.035	/$0.06
HX	lb.	.0355†	
Kosmobile	lb.	.0355†	
66	lb.	.0355†	
77	lb.	.0355†	
S	lb.	.0355†	
Kosmos	lb.	.0355†	
Dixie 20	lb.	.035†	
MICRONEX Beads	lb.	.0355†	
Hi-Tear	lb.	.0355	
Mark II	lb.	.0355	
Standard	lb.	.0355	
W-5	lb.	.0355	
W-6	lb.	.0355	
P-33	lb.	.0475	
Pelletex	lb.	.035	/ .06
SPHERON C (bags)	lb.	.0455†	
I (bags)	lb.	.0405	
N (bags)	lb.	.15	
T (bags)	lb.	.09	
Statex	lb.		
STERLING	lb.	.035	
Thermax	lb.	.0225	
"S"	lb.	.0675	
TX	lb.	.0355†	
Velvetex	lb.		
"WYEX BLACK"	lb.	.0355†	
Carbonex Flakes	lb.	.03	/ .035
S	lb.	.031	/ .036
Plastic	lb.	.031	/ .0335
Clays			
Aerfloted Hi-White	ton	10.00	
LGB	ton	15.00	
Paragon (50-lb. bags)	ton	10.00	
Suprex (50-lb. bags)	ton	10.00	/23.50
Catalpo, c.l.	ton	30.00	
China	ton	25.00	
Dixie	ton	10.00	/22.50
"L"	ton	10.00	
Langford	ton	8.50	
McNamee	ton	10.00	
Par	ton	10.00	
Paraforce, c.l.	ton	50.00	
Witco, c.l.	ton	10.00	
Cumar EX	lb.	.05	
MH	lb.	.065	/ .115
V	lb.	.095	/ .125
465 Resin	lb.		
"G" Resin	lb.		
Nevindene	lb.		
Silene	ton	80.00	/ 90.00
"EF"	lb.	.055	/ .06

Reodorants

Amora A	lb.		
B	lb.		
C	lb.		
D	lb.		
Para-Dors	lb.	.65	/ 5.00
Rodo No. 0	lb.	4.00	/ 4.50
10	lb.	5.00	/ 5.50

Rubber Substitutes

Black	lb.	.085	/ .13
Brown	lb.	.085	/ .1375
White	lb.	.09	/ .15
Factice			
Amberex Type B	lb.	.20	
Brown	lb.	.095	/ .19
Neophax A	lb.	.165	
B	lb.	.165	
White	lb.	.10	/ .20
Polyester, Millable 56-40A	lb.	.36	/ .38
Vulprene 72-28AR	lb.	.40	/ .45
Dispersion B7-41	lb.	.25	/ .26

Softeners and Plasticizers

Ambidex Regular	lb.		
S	lb.		
B.R.T. No. 7	lb.	.02	/ .021
Bondogen	lb.	.98	/ 1.05
Bunnatol (for synthetic rubber)	lb.		
G	lb.	.40	/ .50
S	lb.	.40	/ .50
Burgundy pitch	lb.		
Copene Resin	lb.	.32	
Cycline oil	gal.	.14	/ .20
Dipolymer Oil	gal.	.33	/ .38
Dispersing Oil No. 10	lb.	.0375	/ .04
Falkomer 106	lb.	.30	
108	lb.	.30	
LM-Nypene (drums)	lb.	.25	
LX-436 (tank car)	lb.	.027	
Myristilene	lb.	.20	/ .30
Nevinol	lb.	.13	/ .14
Nuba resinous pitch (drums)			
Grades No. 1 and No. 2	lb.	.29	
3-X	lb.	.0425	
Nypene Resin	lb.	.32	
Palm oil (Witco), c.l.	lb.		
Palmalene	lb.	.15	/
Palmol	lb.	.16	/ .25
Para Flux (reg.)	gal.	.17	/ .18
No. 2016	gal.	.135	/ .19
Para Lube	lb.	.046	/ .048
Paradene No. 1 (drums)	lb.	.0525	
Special (drums)			
20 to 35° C. M.P.	lb.	.0625	
35 to 45° C. M.P.	lb.	.0625	
45 to 75° C. M.P.	lb.	.0575	
Peptizene	lb.	.65	
Piccocizer "30"	lb.		
Piccolyte Resins	lb.	.147	/ .185
Piccoumaron Resins	lb.	.045	/ .15
Pictar	gal.	.18	/ .23
Pine tar	gal.		
Oil	gal.	.45	

†Price quoted is f.o.b. works (bags). The price f.o.b. works (bulk) is $0.033 per pound. All prices are carlot.

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INDUSTRIAL PRECISION SCALES

Plasticizer B	lb.	$0.35 / .45
Plastoflex No. 10	lb.	.20 /
No. 20	lb.	.25 /
Plastogen	lb.	.0775 / .08
Plastone	lb.	.27 / .30
R-19 Resin (*drums*)	lb.	.1075
21 Resin (*drums*)	lb.	.1075
Reogen	lb.	.115 / .12
RPA No. 1E	lb.	.55
2	lb.	.65
3	lb.	.46
4	lb.	.80
Tackol	lb.	.085 / .18
Tarzac	lb.	.23 / .24
Tonox	lb.	.50 / .59
Vistac No. 1	lb.	.20 / .214
No. 2	lb.	.214 / .227
Witco No. 20, *l.c.l.*	gal.	.20
X-1 resinous oil (*tank car*)	lb.	.011 / .016
XX-100 Resin	lb.	.0525

Softeners for Hard Rubber Compounding

Resin C Pitch 45°C. M.P.	lb.	.015 / .016
60°C. M.P.	lb.	.015 / .016
75°C. M.P.	lb.	.015 / .016

Solvents

Beta-Trichlorethane	lb.	.20
Carbon Bisulphide	100 lbs.	5.75
Tetrachloride	gal.	.80
Cosol No. 1	gal.	.26
No. 2	gal.	.25
No. 3	gal.	.22
Industrial 90% benzol (*tank car*)	gal.	.15 / .22
Nevsol	gal.	.245 / .31
Picco	gal.	.22 / .32
Skellysolve	gal.	

Stabilizers for Cure

Barium Stearate	lb.	.29 / .32
Calcium Stearate	lb.	.26 / .27
Laurex (*bags*)	lb.	.1475 / .1725
Lead Stearate	lb.	
Magnesium Stearate	lb.	.31 / .32
Stearex B	lb.	.145 / .155
Beads	lb.	.1425 / .1525
Stearic acid, single pressed	lb.	.145 / .155
Stearite, *c.l.*	lb.	.1425
Zinc Laurate	lb.	.29 / .32
Stearate	lb.	.31 /

Synthetic Rubber

Agripol Solids *l.c.*	lb.	.44 / .52
Solutions *l.c.*	lb.	.27 / .29
Hycar OR-15	lb.	.62 /
OR-25	lb	.56 /
OS-10	lb.	.56 /
Neoprene Latex Type 571	lb.	.25
60	lb.	.36
Neoprene Type CG	lb.	.70
E	lb.	.65
FR	lb.	.75
G	lb.	.70
ILS	lb.	.70
KNR	lb.	.75
M	lb.	.65
Perbunan 26	lb.	.63
Synthetic 100	lb.	.41
"Thiokol" Type "A"	lb.	.35
"FA"	lb.	.50
"RD"	lb.	.70
Molding powder No. 455	lb.	.71
472	lb.	.61

Tackifiers

B.R.H. No. 2	lb.	.02 / .021
LX-433 (*tank car*)	lb.	.068
P.H.O. (*drums*)	lb.	.24
Plastac	lb.	.10 / .12

Vulcanizing Ingredients

Magnesia, light (for neoprene)	lb.	.26
Sulphur	100 lbs.	2.05
Chloride (*drums*)	lb.	.04
Telloy	lb.	1.75
Thiogen 6	lb.	.18 / .25
10	lb.	.18 / .25
Vandex	lb.	1.75

(See also Colors—Antimony)

Waxes

736 (clear)	gal.	$1.25
1515-A (black)	gal.	1.35
Carnauba, No. 3 chalky	lb.	
2 N.C.	lb.	
3 N.C.	lb.	
1 Yellow	lb.	.8325
2	lb.	.8125
Carnube	lb.	.49 / $0.59
Monten	lb.	.12 / .17
Rubber Wax No. 118, Neutral	gal.	.76 / 1.31
Colors	gal.	.86 / 1.41

Rims Approved and Branded by The Tire & Rim Association

Rim Size	Mar., 1943
15" & 16" D. C. Passenger	
16x4.00E	12,894
16x4.25E	8,718
16x4.50E	5,315
16x5.00E	2,356
15x5.00F	298
16x5.00F	268
15x5.50F	3,179
16x5.50F	458
17" & Over D. C. Passenger	
18x2.15B	13,772
Military	
16x4.50CE	105,977
16x6.50CS	60,964
18x8.00CV	2,747
20x4.50CR	10,173
20x6.00CT	23,928
22x6.00CT	3,376
20x10.00CW	2,953
24x10.00CW	648
Flat Base Truck	
20x4.33R (6")	13,906
15x5.00S (7")	1,160
16x5.00S (7")	3,611
18x5.00S (7")	1,183
20x5.00S (7")	253,427
15x6.00T (8")	2,831
18x6.00T (8")	21
20x6.00T (8")	47,496
22x6.00T (8")	1,006
18x7.33V (9 10")	154
20x7.33V (9 10")	30,040
22x7.33V (9 10")	422
24x7.33V (9 10")	2,747
19x8.37V (11")	383
20x8.37V (11")	2,268
24x8.37V (11")	377
Semi D. C. Truck	
16x4.50E	644
16x5.50F	1,509
Tractor & Implement	
12x3.00D	8,178
20x8.00T	1,316
24x8.00T	3,448
32x8.00T	927
36x8.00T	58
DW11-26	666
DW11-30	1,256
DW11-38	352
Cast	
24x11.25	31
24 x 15.00	84
TOTAL	637,525

Dividends Declared

Company	Stock	Rate	Payable	Stock of Record
Anaconda Wire & Cable Co.	Com.	$0.25	Apr. 19	Apr. 9
Dayton Rubber Mfg. Co.	Com.	0.25	May 1	Apr. 17
Detroit Gasket & Mfg. Co.	6% Cum. Pfd.	0.30 q.	June 1	May 15
Detroit Gasket & Mfg. Co.	Com.	0.25	Apr. 26	Apr. 10
DeVilbiss Co.	Pfd.	0.17½ q.	Apr. 15	Mar. 29
Firestone Tire & Rubber Co.	6% Cum. Pfd. A	1.50 q.	June 1	May 15
General Cable Corp.	7% Pfd.	1.75 accum.	May 1	Apr. 24
Hercules Powder Co.	6% Pfd.	1.50 q.	May 15	May 4
Lima Cord Sole & Heel Co.	Com.	0.10 irreg.	Mar. 15	Mar. 5
Midwest Rubber Reclaiming Co.	Com.	0.50 q.	May 1	Apr. 20
Mohawk Rubber Co.	Com.	0.50	Apr. 15	Mar. 31
Norwalk Tire & Rubber Co.	7% Pfd.	0.87½ q.	July 1	June 15
Okonite Co.	Com.	0.50 extra	May 1	Apr. 15
Okonite Co.	Com.	1.50 q.	May 1	Apr. 15
Okonite Co.	6% Pfd.	1.50 q.	June 1	May 14
Tyer Rubber Co.	Com.	0.50	May 15	May 10
Tyer Rubber Co.	Pfd.	1.50 q.	May 15	May 10
U. S. Rubber Reclaiming Co.	Pfd.	0.75 accum.	Apr. 5	Mar. 29
Westinghouse Air Brake Co.	Com.	0.25	June 15	May 15
S. S. White Dental Mfg. Co.	Com.	0.30	May 15	Apr. 30

RECLAIMED RUBBER

WHILE reclaimers experienced some lessening of demand with the stopping of production of the all-reclaim Victory tire on March 31, the relaxation of regulations for civilian recaps has resulted in an increased demand for camelback, and production of reclaimed rubber is still inadequate to fill all orders promptly. Announcement that the Rubber Reserve Co. would not buy any more household or Victory scrap other than that in the dealers' hands on March 9 was considered as a helpful move by reclaim manufacturers, who are oversupplied with this type of scrap. Concern is being expressed that even though rubber products are marked during manufacture to indicate the type or types of synthetic rubber used, if mold overflow and processing scrap are not segregated at the source, scrap classification will still be incomplete, and considerable difficulty experienced when scrap containing larger and larger amounts of synthetic rubber begins to flow to the reclaiming plants.

The present ceiling prices on selected grades of reclaimed natural rubber are:

Ceiling Prices

	Sp. Grav.	¢ per Lb
Auto Tire		
Black Select	1.16-1.18	6½/ 6¾
Acid	1.18-1.22	7½/ 7¾
Shoe		
Standard	1.56-1.60	7 / 7¼
Tubes		
Black	1.14-1.26	11¼/11½
Gray	1.15-1.26	12½/13¼
Red	1.15-1.32	12 /12¾
Miscellaneous		
Mechanical blends	1.25-1.50	4½/ 5½
White	1.35-1.50	13½/14½

The above list includes those items or classes only that determine the price bases of all derivative reclaim grades. Every manufacturer produces a variety of special reclaims in each general group separately featuring characteristic properties of quality, workability, and gravity at special prices.

Sisal Reclaim Impregnated Pads for Rubber Saving

LOOM sisal impregnated with reclaimed rubber is now being used to replace solid and sponge rubber products with an appreciable saving in rubber. Pads have satisfactory low permanent set characteristics along with the desired cushioning effect. These reclaim impregnated pads have a weight ratio advantage over rubber of 1 to 7, which is a factor of importance in all types of manufacturing. Felt impregnated with many of the synthetic rubbers or plastics for insulation, anti-vibration, washers, buffers, etc. may also be obtained fabricated to any size or shape. Automotive Rubber Co.

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PIGMENTS FOR THE RUBBER INDUSTRY

Red Lead (95% · 97% · 98%) **Sublimed Blue Lead**
Sublimed Litharge **Sublimed White Lead**
Litharge **Basic White Lead Silicate**
Basic Carbonate of White Lead

• The above products are among the comprehensive line of zinc and lead pigments manufactured by The Eagle-Picher Lead Company for the rubber, paint and other process industries. Eagle-Picher research facilities are available to manufacturers on request. Write for free samples and literature.

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COTTON FABRICS

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and

ARMY
Ducks

HOSE and BELTING
Ducks

Drills

Selected
Osnaburgs

Curran & Barry
320 BROADWAY
NEW YORK

COTTON & FABRICS

NEW YORK COTTON EXCHANGE WEEK END CLOSING PRICES

	Feb. 27	Mar. 27	Apr. 3	Apr. 10	Apr. 17	Apr. 24
Futures						
May	20.07	20.31	20.45	20.11	20.15	20.16
July	19.86	20.14	20.26	19.87	19.90	19.96
Oct.	19.69	19.96	20.06	19.68	19.89	19.88
Dec.	19.65	19.92	20.02	19.63	19.89	19.83
Jan.	19.62	19.91	20.00	19.60	19.88	19.80

New York Quotations

April 27, 1943

Drills

38-inch 2.00-yard	yd.	....
40-inch 1.45-yard		....
50-inch 1.52-yard		$0.29
52-inch 1.85-yard		.23 7/8
52-inch 1.90-yard		.2325
52-inch 2.20-yard		.20511
52-inch 2.50-yard		.185
59-inch 1.85-yard		.23851

Ducks

38-inch 2.00-yard D. F.	yd.	.215
40-inch 1.45-yard S. F.		.29 3/4
51½-inch 1.35-yard D. F.		.33 1/2
72-inch 1.05-yard D. F.		.43
72-inch 17-21 ounce		.48 7/8

Mechanicals

Hose and belting	lb.	.42 3/4

Tennis

51½-inch 1.35-yard	yd.	.31 1/2
51½-inch 1.60-yard	yd.	.27 1/8
51½-inch 1.90-yard	yd.	.23 3/8

Hollands—White

Blue Seal

20-inch	yd.	.13 1/2
30-inch		.24 1/4
40-inch		.27

Gold Seal

20-inch	yd.	.14 1/2
30-inch		.25 3/4
40-inch		.29

Red Seal

20-inch	yd.	.12 1/4
30-inch		.22
40-inch		.24 1/2

Osnaburgs

40-inch 2.34-yard	yd.	.15 1/2
40-inch 2.48-yard		.14 5/8
40-inch 2.56-yard S. F.		.14578
40-inch 3.00-yard		.12 3/4
40-inch 7-ounce part waste		.15
40-inch 10-ounce part waste		.21 3/8
37-inch 2.42-yard clean		.15 1/4

Raincoat Fabrics

Cotton

Bombazine 64 x 60	yd.	....
Plaids 60 x 48		....
Surface prints 64 x 60		....
Print cloth, 38½-inch, 64 x 60		.08971

Sheetings, 40-inch

48 x 48, 2.50-yard	yd.	.16200
64 x 68, 3.15-yard		.13968
56 x 60, 3.60-yard		.11944
44 x 40, 4.25-yard		.09764

Sheetings, 36-inch

48 x 48, 5.00-yard	yd.	.08600
44 x 40, 6.15-yard		.06991

Tire Fabrics

Builder

17¼ ounce 60" 23/11 ply Karded peeler	lb.	.55 1/2

Chafer

14 ounce 60" 20/8 ply Karded peeler	lb.	.54 1/2
9¾ ounce 60" 10/2 ply Karded peeler	lb.	.54 1/2

Cord Fabrics

23/5/3 Karded peeler, 1 3/16" cotton	lb.	.55 1/2
15/3/3 Karded peeler, 1 3/16" cotton	lb.	.53 1/2
12/4/2 Karded peeler, 1 3/16" cotton	lb.	.54 1/2
23/5/3 Karded peeler, 1¼" cotton	lb.	.55 1/2

Leno Breaker

8¼ ounce and 10¼ ounce 60" Karded peeler	lb.	.55 1/2

THE shadow of cotton ceilings hung heavy over a higher-price minded April market, as trade representatives exerted pressure on government agencies. But Washington's no-news attitude on the subject resulted in the proverbial good-news interpretation, and the Exchange attempted to steady itself as the silence on price clamps continued. Evidently cotton men fear that an OPA ceiling on cotton will result in the same clo ed-for-the-duration fate that befell other price-fixed commodity exchanges.

A whirlwind of other changes, however, ensued in the past month. The Bankhead Bill, cynosure of March trading circles, died an inconspicuous death. Its principle was revived, though, by a House Appropriations Committee move designed to force farm products prices to parity levels. In its appropriations report for the coming fiscal year the Committee denied any authority to obligate the government for future parity payments and at the same time slashed $100,000,000 from the Department of Agriculture's requested $400,000,000 for soil conservation payments next year. If the House body is successful in its aims, Congress may achieve some of the goals it was striving for in the vetoed Bankhead measure. Still another unexpected Committee action was the halting of cotton and wheat crop insurance, effective August 1, 1943. This, however, will not affect insurance placed before that date or previous claims against the insurance fund, the Committee explained. All this was simultaneous with Secretary of Agriculture Wickard's testimony before the House Agricultural Committee in which he revealed the cotton production goal as 11,300,000 bales for 1943, against the 1935-39 figure of 13,149,000. Mr. Wickard emphasized the acuteness of the labor dearth this year as well as that of farm machinery and fertilizer.

The OPA and the War Food Administration have announced the sales of Commodity Credit Corp. stocks at 21.38¢ for middling 15/16-inch cotton, the calling of CCC loans on long staple cotton, and steps to formulate a permanent maximum price regulation for raw cotton. The gentleness of this measure, according to Capitol rumor, may be attributed to the fact that War Stabilization Administrator James F. Byrne is being linked with the next presidential election and that therefore all moves that would alienate the cotton states are best avoided wherever possible.

The WFA announced that, effective immediately, the CCC will offer government-owned cotton for sale. The sales price will be 21.75¢ per pound for middling 15/16-inch cotton stored in the Group B mill area of the Carolinas. This is equivalent to an average price for middling 15/16-inch cotton on the ten spot markets of 21.38¢ per pound. Since there are no officially quoted premiums and discounts for the different grades and staple lengths of irrigated cotton, CCC is offering this cotton on a bid basis. It is believed that the order will result in some growers selling stocks they have been holding in hopes of rocket prices. In effect, the order serves notice that cotton prices will go no higher and advises growers they might as well sell now. The 1942 crop alone, totaling 12,500,000 bales, officials claim, is sufficient to meet all domestic and export needs for this year. There is some evidence, in fact, that prices may go lower. The average price for the ten spot markets on 15/16-inch middling on April 24 was about 21.21¢, lower than the average price of 21.38¢ for April 7. CCC officials, trade representatives, and members of the Congressional cotton bloc feel that this measure will make cotton available while price ceilings would merely protect the price.

The price of 15/16-inch spot middling grade dropped from 22.19¢ on April 2 to 21.82¢ on April 12, rose to 22.00¢ on April 24, and closed at 22.01 on May 3.

Fabrics

The demand for 3.15 and 3.60 sheetings for army raincoats appears beyond the industry's ability to produce until all of this sheeting production is channeled into this field. The recent Quartermaster Corps' invitation for 63,000,000 yards of these goods was under-subscribed. The demand on the 36-inch low end sheetings like 6.15's is very large for ordnance work where it is combined with cellophane and wax for heat sealing bags and packages of ordnance parts for overseas shipments. The raincoat industry reveals also that goods are becoming more and more scarce for civilian purposes, and the trade is getting to a point where it will accept any reasonable substitute for a particular cloth it has been running.

Cotton fabric prices held firm at ceiling levels. The war is stimulating demand for standard cotton cloths in heavy and intermediate weights such as rubber goods manufacturers are following with close interest. Producers of the heavier fabrics are generally sold three months or more in advance, with pressure for fabric supplies tempting them more and more into remote delivery periods. Cloth distributers and producers are confident of maintenance of values over near future months, but are conservative at this time about risking undertakings too far in the future.

FINANCIAL

(Continued from page 168)

Phelps Dodge Corp., New York, N. Y. For 1942: consolidated net income, after all charges but mine depletion, $14,051,568, equal to $2.77 each on 5,071,260 capital shares outstanding, compared with $14,200,745, or $2.80 a share, in 1941; sales, $132,379,743, against $104,656,671; taxes, about $22,000,000, against $15,060,000.

Thermoid Co., Trenton, N. J., and subsidiaries. For 1942: net income (partially subject to renegotiations), after $537,412 income and excess profits taxes, debt retirement credit of $30,000, and post-war refund credit of $5,700, $434,445, equal to 70¢ a common share, compared with $678,609, or $1.20 a common share, in 1941.

Union Carbide & Carbon Corp., New York, N. Y. For 1942: net income, $38,088,723, equal to $4.10 a share, against $42,041,625, or $4.35 a share, in 1941.

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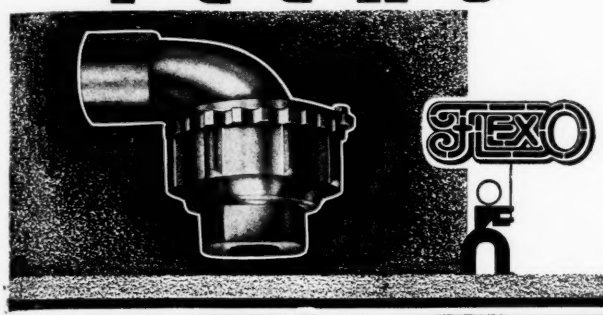

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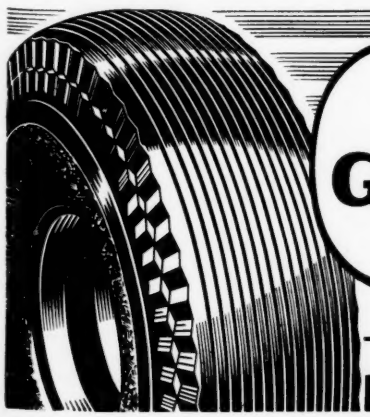

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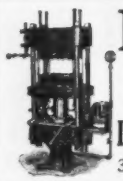

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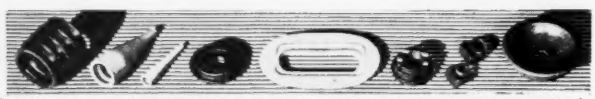

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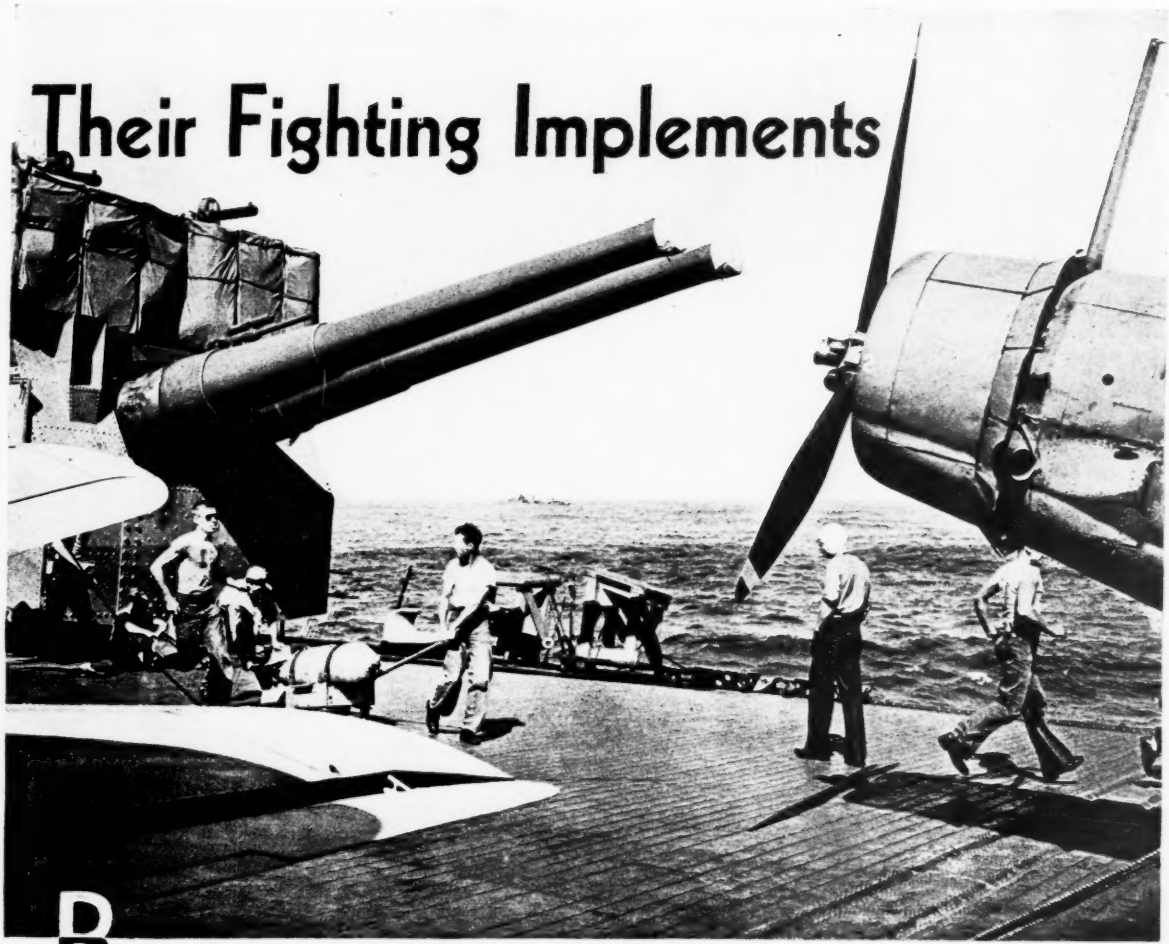

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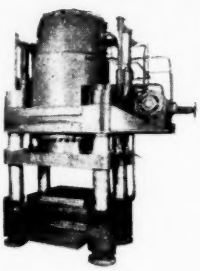

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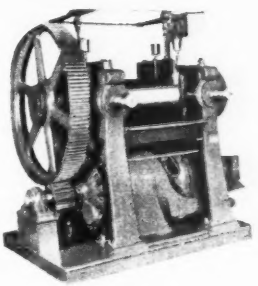

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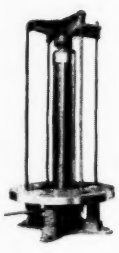

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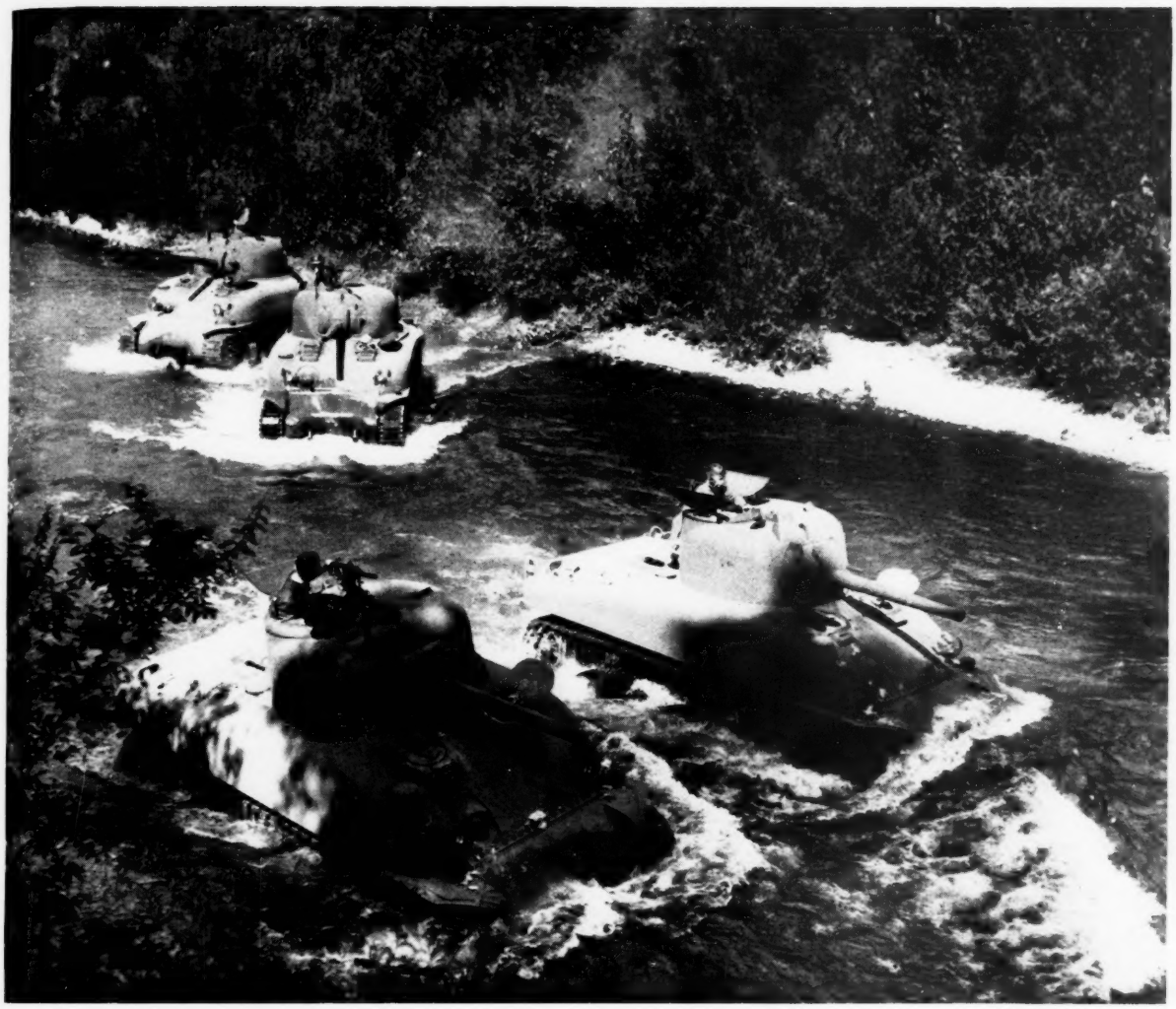

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